





Boring ID

NW

Project Number

0168.022.003.001 Sheet 1 of 1

# SOIL BORING LOG

Project: AS PRE-DESIGN

Location: ATI WAH CHANG, ALBANY, OR

Drilling Contractor: CASCADE

Drilling Method: 6in SONIC-TRACK MOUNT

Start Date: 1150

End Date: 1320

Field Personnel: P. PELLEGRIN

Sampling Method: COMPOSITE

Water Levels:

Start Card No: L

OWRD ID:

Total Depth: 16.5 FT

| Depth<br>Below<br>Surface<br>(ft) | Sample                          |                           | Description<br><br>Soil Name, USCS Group Symbol, Color, Moisture,<br>Relative Density/Consistency, Soil Structure,<br>Mineralogy         | Comments<br><br>Air Monitoring/PID Readings, Sheen/Odor, Issues<br>Encountered, Water Levels |
|-----------------------------------|---------------------------------|---------------------------|--|--|
|                                   | Sample<br>Interval/<br>Recovery | Lab<br>Sample<br>Interval |  |  |
| 2.5                               | 0                               | TO 8 FT                   | ASPHALT - 0 to 4 in<br>LOOSE, DRY, BROWN SAND AND<br>GRAVEL FILL TO 2 FT<br><br>DENSE, GRAY, MOIST SILT<br>(CML) WITH CLAY. 2 FT to 6 FT | 0.0 ppm V AT 2 FT<br><br>0.0 ppm V AT 3 to 4 FT  |
| 5                                 |                                 |                           |  | SPT 5-8-5 (5 FT to 6.5 FT)   |
| 7.5                               |                                 |                           | DRY, BROWN SILT (CML)<br>WITH 1 in MINUS SUB-ROUNDED<br>GRAVELS: 6 TO 8 FT   | 0.0 ppm V (7 to 8 FT)  |
| 10                                | 8<br>TO<br>11<br>FT             |                           | LOOSE, YELLOW-BROWN GRAVEL<br>(GM) WITH SILT AND COARSE<br>SAND. GRAVELS 2 in MINUS<br>SUB-ROUNDED. 8 to 11 FT.                          | 68 ppm V (11 FT)<br>SPT 10-15-17 (10-12.5 FT)<br>ODOR (12-13 FT)                             |
| 12.5                              | 11<br>TO<br>14<br>FT            |                           | LOOSE, GRAY, WET GRAVEL<br>(GM) WITH COARSE SAND.<br>GRAVELS 3 in MINUS, SUB-<br>ROUNDED. 11 to 13 FT.                                   | 171 ppm V (13 FT)  |
| 15                                |                                 |                           | DENSE, GRAY, DRY, WEATHERED<br>SILTSTONE (SPENCER FORMATION)<br>14 TO 15 FT.   | SPT 50-50-2 in (15 to 16.5 FT)   |
|                                   |                                 |                           | TD - 16.5 FT   |  |

SPT = STANDARD PENETRATION TEST



Boring ID

SE

Project Number

0168.022.003.001

Sheet 1 of 1

# SOIL BORING LOG

Project: AS PRE-DESIGN

Location:

Drilling Contractor: CASCADE

Drilling Method: 6-in SONIC

Start Date: 08-03-15

End Date: 08-03-15

Field Personnel: P. PELLEGRIN

Sampling Method: COMPOSITE

Water Levels:

Start Card No: L

OWRD ID:

Total Depth: 16.5 ft

| Depth<br>Below<br>Surface<br>(ft) | Sample                          |                           | Description  | Comments   |
|-----------------------------------|---------------------------------|---------------------------|--|--|
|                                   | Sample<br>Interval/<br>Recovery | Lab<br>Sample<br>Interval | Soil Name, USCS Group Symbol, Color, Moisture,<br>Relative Density/Consistency, Soil Structure,<br>Mineralogy                        | Air Monitoring/PID Readings, Sheen/Odor, Issues<br>Encountered, Water Levels |
| 0                                 |                                 | 0                         | ASPHALT. 0 to 5 in.  |  |
| 2.5                               |                                 | 0 to 5 FT                 | LOOSE LIGHT BROWN DRY GRAVELS AND SAND (FILL). GRAVELS 1 1/2 in MINUS AND ANGULAR. 5-in to 4 ft.                                     | 0.0 ppmv (at 2 ft)   |
| 5.0                               |                                 |                           | LOOSE, DRY, BROWN SILT WITH 1/4-in MINUS ROUNDED GRAVELS. BRICK FRAGMENTS.   | 0.0 ppmv (at 5 ft)<br>SPT - 0 (NO RESISTANCE AT 5-6.5 ft)                    |
| 7.5                               |                                 |                           | DENSE, GRAY, MOIST SILT (ML) WITH SOME WELL GRADED GRAVELS. 5.5 to 9 ft.   | 12.0 ppmv (at 7 ft)  |
| 10                                |                                 | 9 TO 12 FT                | DENSE, YELLOW-BROWN SILT (ML) WITH GRAVEL. SUB ROUNDED 3-in MINUS. 9 to 12 ft.   | 54 ppmv (at 10 ft)<br>SPT 8-13-22 (10-11.5 ft)                               |
| 12.5                              |                                 |                           |  | 7.2 ppmv (at 12 ft)  |
| 15                                |                                 | 12 TO 15.5 FT             | LOOSE, GRAY, MOIST GRAVEL (GM) WITH SILT. GRAVELS SUB ROUNDED AND WELL GRADED. MANY FINE COARSE GRAVELS 1/8-in MINUS. 12 to 15.5 ft. | 10.1 ppmv (at 15 ft)<br>SPT 2-5-11 (15-16.5 ft)                              |
|                                   |                                 |                           | TD - 16.5 ft   |  |

SPT = STANDARD PENETRATION TEST





Boring ID

SW

Project Number

0168,002,003.001 Sheet 1 of 2

## SOIL BORING LOG

Project: AS PRE-DESIGN Location: ATI WAH CHANG, ALBANY, OR

Drilling Contractor: CASCADE Drilling Method: 6-in SONIC

Start Date: 08-03-15 End Date: 08-03-15 Field Personnel: P. PELLEGRIN

Sampling Method: COMPOSITE Water Levels:

Start Card No: L

OWRD ID:

Total Depth: 20 FT

| Depth<br>Below<br>Surface<br>(ft) | Sample                          |                           | Description<br>Soil Name, USCS Group Symbol, Color, Moisture,<br>Relative Density/Consistency, Soil Structure,<br>Mineralogy | Comments<br>Air Monitoring/PID Readings, Sheen/Odor, Issues<br>Encountered, Water Levels |
|-----------------------------------|---------------------------------|---------------------------|--|--|
|                                   | Sample<br>Interval/<br>Recovery | Lab<br>Sample<br>Interval |  |  |
| 0                                 |                                 |                           | ASPHALT. 0 to 5-in   |  |
| 2.5                               |                                 | 0<br>TO<br>7.5<br>FT      | LOOSE, DRY TO MOIST GRAVEL<br>FILL WITH SAND. 5-in to 4ft  | 0.0ppmV (2ft)  |
| 5.0                               |                                 |                           | DENSE, GRAY, MOIST SILT<br>(ML) WITH ORANGE MOTTLING<br>SOME CERAMIC FRAGMENTS.<br>4ft to 7.5ft.                             | 0.00ppmV (4ft)<br>SPT 2-2-5 (5ft to 6.5ft)   |
| 7.5                               |                                 |                           |  | 0.0 ppmV (7ft)   |
| 10                                |                                 | 7.5<br>TO<br>10<br>FT     | LOOSE, YELLOW, MOIST GRAVEL<br>(GM) WITH COARSE SANDS.<br>SUB-ROUNDED 2-in MINUS<br>GRAVELS. 10ft to 14ft.                   | 0.0ppmV (9ft)<br>SPT 21-18-21 (10ft to 11.5ft)   |
| 12.5                              |                                 |                           |  | 7.6 ppmV (11ft)  |
|                                   |                                 |                           |  | 14.4 ppmV (13ft)   |
| 15                                |                                 | 14<br>TO<br>16<br>FT      | LOOSE, GRAY GRAVELS (GM)<br>WITH COARSE SANDS AND<br>MANY 1-in MINUS ROUNDED<br>GRAVELS. WET. 14ft to 16ft.                  | 0.0ppmV (15ft)<br>SPT 50-5in (15ft)  |

SPT = STANDARD PENETRATION TEST



GS FORM:  
BORE 1/99

## BOREHOLE RECORD

| DEPTH (ft) | MATERIAL DESCRIPTION   | SYMBOLIC LOG | ELEVATION (ft) | SAMPLES       |      |             |            |                   | TIME | COMMENTS   |
|------------|--|--------------|----------------|---------------|------|-------------|------------|-------------------|------|--|
|            |  |              |                | SAMPLE NAME   | TYPE | BLOW COUNTS | % RECOVERY | PID READING (ppm) |      |  |
| 1          | Asphalt.   |              |                |               |      |             | 100        |                   |      | Temporary well consisted of 1-inch diameter 0.010-inch slot schedule 40 PVC screen set from 10 to 15 feet bgs to facilitate groundwater sample collection. |
| 2          | <u>Fill</u> : Sandy gravel, brown to gray, dry.  |              |                |               |      |             |            |                   |      |  |
| 3          | Clayey silt with trace gravel (angular ~4mm), moist, dense, medium to high plasticity. |              |                |               |      |             |            |                   |      |  |
| 4          |  |              |                |               |      |             |            |                   |      |  |
| 5          |  |              |                |               |      |             | 90         |                   |      |  |
| 6          | Gravel (fine), dark gray to brown, moist.  |              |                |               |      |             |            |                   |      |  |
| 7          | <u>Willamette Silt</u> : Sandy silt, brown with mottled reddish-brown, moist.          |              |                |               |      |             |            |                   |      |  |
| 8          | Becomes wet.   |              |                |               |      |             |            |                   |      |  |
| 9          | <u>Linn Gravel</u> : Sandy silt with some gravel, brown, dry, well-graded.             |              |                | SB-04-9.5-10  |      |             |            |                   |      |  |
| 10         |  |              |                | GW-04-10-15   |      |             | 100        |                   |      |  |
| 11         |  |              |                |               |      |             |            |                   |      |  |
| 12         |  |              |                | SB-04-12.5-13 |      |             |            |                   |      |  |
| 13         |  |              |                | SB-04-13-13.5 |      |             |            |                   |      |  |
| 14         | Sandy gravel (fine, angular), little silt, green-gray, wet.                            |              |                | SB-04-14-14.5 |      |             |            |                   |      |  |
| 15         | <u>Spencer Formation</u> : Siltstone (weathered), green-gray, moist.                   |              |                | SB-04-14.5-15 |      |             | 100        |                   |      |  |
| 16         | Total boring depth = 16' bgs.  |              |                |               |      |             |            |                   |      |  |

CONTRACTOR Boart Longyear

EQUIPMENT Geoprobe 6620

DRILL MTHD Direct Push

DIAMETER 2.25"

LOGGER EKM

REVIEWER JW

NORTHING

EASTING

ANGLE Vertical

BEARING -----

PRINTED Jan 14, 09

REMARKS: Borehole backfilled with bentonite granules. Soil sample interval indicated in sample name by last two values. Temporary well screened interval indicated in groundwater sample by last two values.

COORDINATE SYSTEM:

SEE KEY SHEET FOR SYMBOLS AND ABBREVIATIONS

# Well Number: I-1

Sheet: 1 of 1

**Client:** Wah Chang  
**Project:** Acid Sump Area  
**Location:**  
**Project Number:** 168-009

**Driller:** Cascade Drilling  
**Drilling Method:** Geoprobe truck- mounted 6600  
**Sampling Method:**  
**Logged by:** Chris Augustine  
**Start/Finish Date:** 7/8/09 1510- 1530

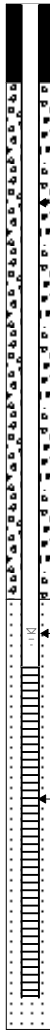
| Depth (ft) | Sample Info     |          | Soil Log | Soil Description   | Depth / Elev | Well Drawing | Well Construction Notes                                       |
|------------|-----------------|----------|----------|--|--------------|--------------|---|
|            | Sample Interval | Recovery |          |  |              |              |   |
| 0          |                 |          |          | Ground Surface   | 0            |              | Background = 0.0 ppm  |
|            |                 |          |          | Concrete   | 0            |              | 4-inch Diameter Borehole (0'-15')                             |
|            |                 |          |          |  | -2           |              | 2-inch Diameter PVC Casing (0'-9.75')                         |
|            | SS              | 2.5      |          | Silty gravel with sand, (GM/CM) orange brown, soft push moist, loose, sand ~ 35%, 30% silt, gravel 35%   | 2            |              |   |
|            |                 |          |          | Silt (ML), orange brown, moist, soft, low plasticity, sand 10-15% fine. A/A, minor GM layer at 6.7 feet  | -4           |              | 3/8-Sodium Bentonite Seal (0'-8.75')                          |
| 5          |                 |          |          |  | 4            |              |   |
|            | SS              | 5        |          |  | -8           |              |   |
|            |                 |          |          | Silty gravel (GM), buff to grey to red brown, dry, loose-medium dense, gravel to 1"silt 35% sand 10-15%<br>As above with sand to 25%, poorly graded sand SP with gravel, orange brown, wet loose, silt 15% | 8            |              | DTW = 9.5' bgs on 7/8/09<br>Sheen, odor, PIU = 85 ppm at 9.5' |
| 10         |                 |          |          |  | -14          |              | 8/12 Prepacked Colorado Silica Sand (9.75'-15')               |
|            | SS              | 3.75     |          |  | 14           |              | Prepack 2-inch Diameter, 20 Slot Screen (9.75'-14.75')        |
|            |                 |          |          | Silty gravel (GM), red-brown-green, moist to wet, weathered bedrock in gravel  | -14          |              |   |
| 15         |                 |          |          |  | 14           |              |   |
|            |                 |          |          |  | -18          |              |   |
|            |                 |          |          | Weathered siltstone, green-blue, dry, oxidized on weathered surface  | 18           |              | TD at 15'   |
| 20         |                 |          |          |  | -18          |              |   |
|            |                 |          |          |  | 18           |              |   |

# Well Number: I-2

Sheet: 1 of 1

**Client:** Wah Chang  
**Project:** Acid Sump Area  
**Location:**  
**Project Number:** 168-009

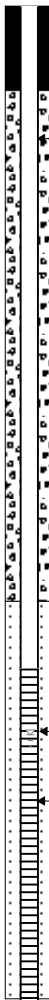
**Driller:** Cascade Drilling  
**Drilling Method:** Geoprobe truck- mounted 6600  
**Sampling Method:**  
**Logged by:** Chris Augustine  
**Start/Finish Date:** 7/8/09 1340- 1415

| Depth (ft) | Sample Info     |          | Soil Log | Soil Description   | Depth / Elev | Well Drawing  | Well Construction Notes   |
|------------|-----------------|----------|----------|--|--------------|---|---|
|            | Sample Interval | Recovery |          |  |              |   |   |
| 0          |                 |          |          | Ground Surface   | 0            |  <p>Background PID = 0.0 (only recorded due to visible contamination in I-2)</p> <p>4-inch Diameter Borehole (0'-15.5')</p> <p>Concrete Surface Seal (0'-1.2')</p> <p>2-inch Diameter PVC Casing (0'-10')</p> <p>3/8-Sodium Bentonite Seal (1.2'-9')</p> <p>DTW = 9.5' bgs on 7/8/09</p> <p>8/12 Prepack Colorado Silica Sand (9'-15.5')</p> <p>Prepacked 2-inch Diameter, 20 Slot Screen (10'-15')</p> | <p>Wet, PID = 50ppm</p> <p>Sheen, odor, PID = 75.2 ppm</p> <p>H2O no sheen</p> <p>TD at 15.5'</p> |
|            | SS              | 2.1      |          | Concrete   | 0            |   |   |
|            |                 |          |          | Silty gravel (GM), orange brown to grey, moist, loose  | -1           |   |   |
|            |                 |          |          |  | 1            |   |   |
| 5          |                 |          |          |  | -5           |   |   |
|            | SS              | 2.75     |          | Silt (ML) brown, moist, soft, sand- 10%  | 5            |   |   |
|            |                 |          |          | Silty gravel (GM), grey-brown, wet, loose, silt ~ 30%, sand 10-15%   | -6           |   |   |
|            |                 |          |          | Silt, ML, brown, moist, soft, low plasticity   | 6            |   |   |
|            |                 |          |          |  | -7           |   |   |
|            |                 |          |          |  | 7            |   |   |
| 10         |                 |          |          |  | -10          |   |   |
|            | SS              | 5        |          | Silty gravel with sand (GM), brown orange; wet, loose, sand fine to coarse 25%, silt 30%, not plastic, gravel 10 1", angular to subrounded | 10           |   |   |
|            |                 |          |          |  | -13          |   |   |
|            |                 |          |          | A/A, dry, orange-brown-red, mottled  | 13           |   |   |
|            |                 |          |          |  | -15          |   |   |
| 15         | SS              |          |          | Silty gravel (GM), wet, dense, gravel to 1/2", silt brown 30%  | 15           |   |   |
|            |                 |          |          | Weathered siltstone, green-blue to bright green, hard, dry, sand 20-30% fine   | -16          |   |   |
|            |                 |          |          |  | 16           |   |   |
| 20         |                 |          |          |  |              |   |   |



**Sheet:** 1 of 1

**Driller:** Cascade  
**Drilling Method:**  
**Sampling Method:**  
**Logged by:** Chris Augustine  
**Start/Finish Date:** 7/8/09 16:00, 7/8/09 16:30

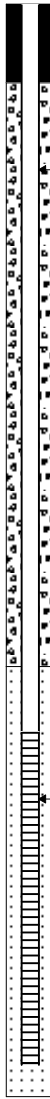
| Depth (ft) | Sample Info     |          | Soil Log | Soil Description  | Depth / Elev  | Well Drawing   | Well Construction Notes           |   |
|------------|-----------------|----------|----------|---|---|--|-----------------------------------|---|
|            | Sample Interval | Recovery |          |   |   |  |                                   |   |
| 0          |                 |          |          | Ground Surface  | 0   |  |                                   |   |
|            | SS              | 1.5      |          | Concrete  | 0   |  | 4-inch Diameter Borehole (0'-15') |   |
|            |                 |          |          |   | Poorly Graded Gravel(GP), grey, dry, dense, silt 10-15%, sand fine to coarse 15%, gravel angular to subangular  |  | -1                                | Concrete Surface Seal (0'-1.3')                     |
|            |                 |          |          |   | Poorly Graded Sand (SP), orange brown, moist, loose, gravel fine to 10% trace silt  |  | -3                                | 2-inch Diameter PVC Casubg (0'-10')                 |
|            |                 |          |          |   |   |  | 3                                 | 3/8-Sodium Bentonite Seal (1.3'-9')                 |
| 5          | SS              | 5        |          | Silt (ML), brown to orange brown mottle, moist, stiff-medium stiff, low plasticity sand fine-medium 10% A/A | -5  |  |                                   |   |
|            |                 |          |          |   |   |  | 5                                 | Dry   |
| 10         | SS              | 5        |          | Silty Gravel with Sand, orange brown to buff dry, loose, gravel to 1/2" round to angular silt = 30          | -10   |  |                                   |   |
|            |                 |          |          |   | Poorly Graded Sand (SP), orange brown, wet, loose, grades silty at 12.0 ft to silty sand (SM) gravel 10-15% silt ~ 30%                                  |  | 10                                | 8/12 Prepacked Colorado Silica Sand (9'-15')        |
|            |                 |          |          |   |   |  | -11                               | DTW = 11' bgs on 7/8/09<br>No sheen, no odor        |
|            |                 |          |          |   | Silty Gravel (GM) with Sand, orange to brown to green, DRY moist, dense to not dense, gravel 3/4" angular to subround silt 35%, sand 20% fine to coarse |  | 11                                | Prepacked 2-inch Diameter, 20 Slot Screen (10'-15') |
|            |                 |          |          |   |   |  | -13                               |   |
| 15         |                 |          |          | Weathered Silstone, blue-green to blue oxidized or weathered surfaces                                       | 13  |  |                                   |   |
|            |                 |          |          |   | -15   |  |                                   |   |
|            |                 |          |          |   | 15  | H2O @ 14.5<br>TD at 15'  |                                   |   |
|            |                 |          |          |   |   |  |                                   |   |
|            |                 |          |          |   |   |  |                                   |   |
|            |                 |          |          |   |   |  |                                   |   |
| 20         |                 |          |          |   |   |  |                                   |   |


# Well Number: EI-5

Sheet: 1 of 1

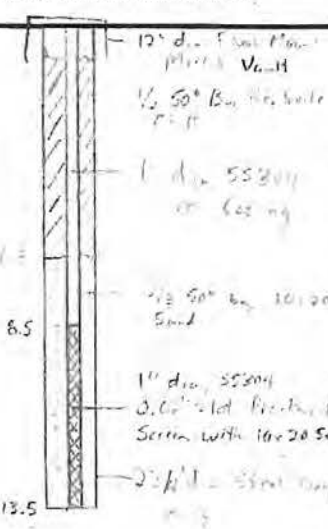
**Client:** ATI Wah Chang  
**Project:** Acid Sump EISB  
**Location:** Albany, OR  
**Project Number:** 168-009-T4

**Driller:** Cascade Drilling, Clakamas, OR  
**Drilling Method:** Truck Mounted Geoprobe  
**Sampling Method:**  
**Logged by:** Peter Pellegrin  
**Start/Finish Date:** 7/9/09 07:00, 7/9/09 10:00

| Depth (ft) | Sample Info     |          | Soil Log | Soil Description   | Depth / Elev | Well Drawing  | Well Construction Notes |
|------------|-----------------|----------|----------|--|--------------|---|-------------------------|
|            | Sample Interval | Recovery |          |  |              |   |                         |
| 0          |                 |          |          | Ground Surface   | 0            |  <p>4-inch Diameter Borehole (0'-16.5')</p> <p>Concrete Surface seal (0'-1.2')</p> <p>Dry</p> <p>2-inch Diameter PVC Casing (0'-11')</p> <p>3/8-Sodium Bentonite Seal (1.2'-10')</p> <p>Moist</p> <p>Moist</p> <p>8/12 Preppacked Colorado Silica Sand (10'-16.5')</p> <p>Prepacked 2-inch Diameter, 20 Slot Screen (11'-16')</p> <p>Moist</p> <p>Well Screen Dry<br/>TD at 16.5'</p> |                         |
|            | SS              | 4        |          | Asphalt and Concrete   | 0            |   |                         |
|            |                 |          |          | Fill Material, dry, gravels 1/2" minus, angular gading to (GM)           | -1           |   |                         |
|            | SS              | 5        |          | Silty Gravel (GM), blue-grey, moist, plastic, poorly graded gravels 1/4" | 5            |   |                         |
|            |                 |          |          | A/A, orange-brown with some molting, moist                               | -8           |   |                         |
|            | SS              | 3.5      |          | Silty Gravel (GM), moist, well graded gravels 3/4" minus                 | 13           |   |                         |
|            |                 |          |          | Spencer Formation, blue-grey, plastic, dense, dry                        | 17           |   |                         |
|            | SS              | 1        |          |  | -17          |   |                         |
| 15         |                 |          |          |  | 17           |   |                         |
| 20         |                 |          |          |  |              |   |                         |

|  |   |   |                            |
|--|---|---|----------------------------|
| <br><b>CH2MHILL</b>       | <b>PROJECT NUMBER</b><br>349339, 07 C3 FS             | <b>BORING NUMBER</b><br>TALLU-1   | SHEET <u>1</u> OF <u>1</u> |
|  | <h2 style="margin: 0;">Monitor Well Geologic Log</h2> |   |                            |
| <b>PROJECT:</b> Wab. Cheng   |   | <b>LOCATION:</b> Acid Courtyard   |                            |
| <b>ELEVATION:</b> TGC = 207.14, Gage = 207.6   |   | <b>DRILLING CONTRACTOR:</b> BLP - 1-88  |                            |
| <b>DRILLING METHOD AND EQUIPMENT USED:</b> 17m Tripod Mounted Geopack 6000 with 2" dia. Core Tube 5ft long |   |   |                            |
| <b>WATER LEVELS:</b> 203.20 12-20-07   |   | <b>START:</b> 10-24-07 1130 <b>END:</b> 10-24-07 1230 <b>LOGGER:</b> S. R. Kinley |                            |

| DEPTH BELOW SURFACE (FT) | INTERVAL (FT) |        |      | STANDARD PENETRATION TEST RESULTS<br>6"-6"-6"-6"<br>(N) | CORE DESCRIPTION<br>SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.   | COMMENTS<br>DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION.  |
|--------------------------|---------------|--------|------|---|---|---|
|                          | RECOVERY (FT) | #/TYPE |      |   |   |   |
|                          |               | #      | TYPE |   |   |   |
|                          |               |        |      |   |   |   |
| 1210                     |               |        |      |   |   |   |
|                          | 2.5           |        | C1   | GM  | SILTY GRAVEL (D:25) dry-moist, light olive gray, densest/silt/clay? CLAYEY SILT (2.5-3.5) - moist to wet, light brown, soft plastic   |  |
| 1225<br>1300             | 5             | 1.0    | C2   | SM<br>GM  | SILTY SAND (3.5-4') - wet, med. brown med dense. Potential obstruction at 4.5 ft. Unable to pull drill rods back. Concrete 4.5-4.8 ft. SILTY/SANDY GRAVEL (5-9.7') - wet, gray-brown, subrounded gravel to 1" dia, med coarse sand, dense. 2" gravel placed sample at 6.2 ft. |   |
| 1315                     | 10            | 1.2    | C3   | GM  | Wet silty (9.7-9.9') - wet, light brown SILT (9.7-10') - wet, dark gray, soft SILTY/SANDY GRAVEL (10-14') - wet, dark gray with fine staining at 13.6-14', fine silt sand interval 10.5-11 ft Dense.  |   |
| 1330                     | 15            |        |      | Refusal   | <p>End casing and log</p> <p>Collect 208 Samples (S. Kinley) at 11 ft and 13.7 ft [GM]</p> <p>Collect 209 Samples at 11 ft and 13.7 ft</p> <p>• Sample for VOC analysis</p>   |   |
| 20                       |               |        |      |   |   |   |

0900 Aled case for the log done  
 0920 Wab. Cheng report and core log  
 1215 Bore for log  
 1130 Bore for log well finished.  
 EP-08.50 Revision 8/31/99  
 330 Refusal at 14 ft

Sample times 11 ft = 1330  
 13.7 ft = 1345

**CH2MHILL**

PROJECT NUMBER

346334.07 C3 FS

BORING NUMBER

TMW-3

SHEET 1 OF 1

# Monitor Well Geologic Log

PROJECT: Wei Chang Albany, OR

LOCATION: Acid Corridor

ELEVATION: 701 207.16 Ground 207.7

DRILLING CONTRACTOR: BLS-12

DRILLING METHOD AND EQUIPMENT USED: Corelog 6600


WATER LEVELS: 202.84 12-26-07 START: 10-25-07 END: 10-26-07

LOGGER: C. M. M. M.

| DEPTH BELOW SURFACE (FT) |    |               |        | STANDARD PENETRATION TEST RESULTS |     | CORE DESCRIPTION<br>SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.   | COMMENTS<br>DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. |   |
|--------------------------|----|---------------|--------|-----------------------------------|-----|---|--|---|
| INTERVAL (FT)            |    | RECOVERY (FT) | #/TYPE | TEST RESULTS                      |     |   |  |   |
|                          |    |               |        | 6"-6"-6" (N)                      |     |   |  |   |
| 5                        | 5  | 2'            | C1     | 11.4                              | SPV | Asphalt 0-2<br>Gravelly clay, sandy, 2-3% moisture, 2-3% clay, 20-30% sand, 20-30% gravel, 20-30% silt.   | 1.5  | 12" dia. flush head<br>Mud - V. H. with<br>J. Ring<br>1/2" dia. Eng.<br>Reinforced concrete |
|                          |    |               |        |                                   |     |   |  |   |
| 10                       | 10 | 23'           | C2     | 25.19                             | SPV | Silty clay, gravelly, 10% sand, 10% clay, 10% silt, 10% gravel, 10% |  |   |


6" core sample 12-26-07  
10" core sample 12-26-07



|  |   |                                       |                            |
|--|---|---------------------------------------|----------------------------|
| <br><b>CH2MHILL</b>             | PROJECT NUMBER<br><b>348339 07 C3 FS</b>              | BORING NUMBER<br><b>7MW4</b>          | SHEET <b>1</b> OF <b>1</b> |
|  | <h2 style="margin: 0;">Monitor Well Geologic Log</h2> |                                       |                            |
| PROJECT: <b>Wab Chee - Albion 02</b>   |   | LOCATION: <b>Acid Contained</b>       |                            |
| ELEVATION: <b>TOC = 207.42 " Ground = 207.9</b>  |   | DRILLING CONTRACTOR: <b>BLK - Pdy</b> |                            |
| DRILLING METHOD AND EQUIPMENT USED: <b>Grout, 600</b>  |   |                                       |                            |
| WATER LEVELS: <b>202.86 12-20-07</b> START: <b>10/10/07 1030</b> END: <b>10/25/07</b> LOGGER: <b>S. M. K. L.</b> |   |                                       |                            |

| DEPTH BELOW SURFACE (FT) | INTERVAL (FT) |        |      | STANDARD PENETRATION TEST RESULTS<br>6"-6"-6" (N) | CORE DESCRIPTION<br>SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY. | COMMENTS<br>DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. |
|--------------------------|---------------|--------|------|---|---|--|
|                          | RECOVERY (FT) | #/TYPE |      |   |   |  |
|                          |               | #      | TYPE |   |   |  |
|                          |               |        |      |   |   |  |
| 0                        |               |        |      | PIP   | 12" dia. PIP, 10' long<br>1/2 bag grout<br>12" dia. PIP, 10' long   |  |
| 5                        | 5             | 2      | C1   | GM  | 12" dia. PIP, 10' long<br>1/2 bag grout<br>12" dia. PIP, 10' long   |  |
| 10                       | 10            | 5      | C2   | GM  | 12" dia. PIP, 10' long<br>1/2 bag grout<br>12" dia. PIP, 10' long   |  |
| 15                       | 15            | 3.5    | C3   | GM  | 12" dia. PIP, 10' long<br>1/2 bag grout<br>12" dia. PIP, 10' long   |  |
| 16                       | 16            | 0.5    | C4   | GM  | 12" dia. PIP, 10' long<br>1/2 bag grout<br>12" dia. PIP, 10' long   |  |

|   |   |                                     |                            |
|---|---|-------------------------------------|----------------------------|
| <br><b>CH2MHILL</b>                      | PROJECT NUMBER<br><b>348339.07.C3.F5</b>              | BORING NUMBER<br><b>TMWS</b>        | SHEET <b>1</b> OF <b>1</b> |
|   | <h2 style="margin: 0;">Monitor Well Geologic Log</h2> |                                     |                            |
| PROJECT: <b>Wah Chang - Alameda OR</b>  |   | LOCATION: <b>Acid Contained</b>     |                            |
| ELEVATION: <b>706 ± 207.04</b> <small>Ground = 207.5</small>  |   | DRILLING CONTRACTOR: <b>314 Pds</b> |                            |
| DRILLING METHOD AND EQUIPMENT USED: <b>Geoprobe 6600</b>  |   |                                     |                            |
| WATER LEVELS: <b>702.69</b> <b>12-20-07</b> START: <b>10/20/07</b> 1345 END: <b>10/22/07</b> LOGGER: <b>S. McLaughlin</b> |   |                                     |                            |

| DEPTH BELOW SURFACE (FT) | INTERVAL (FT) |        |         | STANDARD PENETRATION TEST RESULTS<br>6"-6"-6" (N)                       | CORE DESCRIPTION | COMMENTS                                    |
|--------------------------|---------------|--------|---------|---|------------------|---|
|                          | RECOVERY (FT) | #/TYPE |         |   |                  |   |
|                          |               | TEST   | RESULTS |   |                  |   |
|                          |               |        |         |   |                  |   |
| 0                        |               |        |         |   |                  |   |
| 5                        | 1.7'          | C1     | GM      | CLAYEY SILT (1.7-4.0) dry, light brown, silty clay with 1/4 coarse sand |                  | Flush Mount<br>Mottled Vents<br>with 3 Plug |
| 10                       | 4.0'          | C2     | GM      | SAND (4.0-6.5) wet, yellow, silty sand with 1/4 coarse sand             |                  |   |
| 15                       | 4.0'          | C3     | ML      | SILTSTONE (14-18) dry, light brown, silty clay with 1/4 coarse sand     |                  |   |
| 20                       |               |        |         |   |                  |   |

1345 Sump

1425 Hard Pan





## Technical Memorandum

**To:** Noel Mak, ATI Metals

**From:** Jake Gorski, EIT, GSI Water Solutions, Inc.  
Randy Pratt, PE, GSI Water Solutions, Inc.

**Date:** January 6, 2016

**Re:** Soil Treatability Study; Persulfate Reduction of TCA and TCE in Acid Sump Soils

---

### Purpose and Scope

This technical memorandum provides an overview of a soil treatability study completed for the ATI Wah Chang (Wah Chang), Albany, Oregon, facility (Site) conducted between October 23 and November 11, 2015. The study was used to determine removal rates of trichloroethane (TCA) and trichloroethene (TCE) in bench scale tests that mimic an unmixed 2-foot-deep soil treatment pile. Results of the study will be used in designing the specifications for the soil treatment pile to be used in the planned Acid Sump Source Area excavation project.

Soil for the treatability study was collected from three investigation boreholes in the Acid Sump excavation area on August 3, 2015. Samples also were collected to assess the soil oxidant demand. Results of that analysis are presented in Table 2-1 of the Acid Sump Source Area Remedial Action Plan (Remedial Action Plan; GSI, 2016). Based on the results of the soil oxidant demand analysis, three different treatment options were selected for the soil treatability study:

- Drying soils without the addition of activated sodium persulfate.
- Drying soils with the addition of persulfate at a rate of 2 grams (g) per kilogram (kg) of soil.
- Drying soils and adding persulfate at a rate of 2g/kg.

This technical memorandum discusses how the results of the soil treatability study were used to determine an effective design for managing the contaminated soils from the Acid Sump excavation area.



## Soil Sampling

### Source Area Soil Collection and Analysis

Three soil borings were completed at the Site on August 3, 2015, with a sonic drill rig that collected continuous core soil samples to a depth of approximately 15 feet. The borings were advanced in the northwest, southwest, and southeast corners of the Acid Sump excavation area (see Figure 2-1). Samples were collected to characterize the concentration of chlorinated volatile organic compounds (CVOC) found in the soil and to provide material for the soil treatability study. The analytical results are discussed in Section 5.6 of the Remedial Action Plan. TCA concentrations ranged from 10 to 26,000 micrograms per kg ( $\mu\text{g}/\text{kg}$ ) while TCE was detected in one of the nine soil samples at 6.6  $\mu\text{g}/\text{kg}$  (see Table B-1). The average design concentration for CVOCs in the soil treatment pile was set at 5,000  $\mu\text{g}/\text{kg}$  after applying a safety factor of 1.5 to the average observed concentration value observed in the boreholes (see Section 5.6 of the Remedial Action Plan).

### Treatability Methodology

Soil samples for the treatability study from each borehole were placed into sealed 2-gallon buckets and delivered to APEX Laboratories in Portland, Oregon. Soils were broken up and uniformly composited; gravels larger than 3/8 inch were removed. Because the soils samples were collected from the Acid Sump excavation area, they are representative in terms of grain size, cohesiveness, moisture content, and geochemical composition to those soils that will be treated in the Acid Sump excavation treatment pile. The soil samples were placed in a single large mixing bowl before spiking them with TCA and TCE. When spiking the soils, efforts were made to not increase the moisture content of the soils above those values that typically might be expected in an outdoor soil treatment pile.

Spiked soils were separated into three containers and target persulfate concentrations were added; zero g/kg into first vessel, 2g/kg into the second vessel, and 4g/kg into the third vessel. Soils then were placed into three uncovered 6-inch-diameter pipes to a depth of about 2 feet. Treatment vessels, or microcosms, had sampling ports at the top, middle, and bottom of the pipe so that the degree of treatment could be measured throughout the depth of the soil profile. After placing the soils into the three different microcosms, time zero samples were collected from the top and bottom of the pipes. Table B-2 shows the initial concentrations recorded at the beginning of the test on October 27, 2015. The goal of the CVOC spiking was to initiate the tests with concentrations approximating the 5,000  $\mu\text{g}/\text{kg}$  design value for the excavation soil treatment pile. Some differences in initial concentrations most likely occurred because of the additional mixing time required to distribute the persulfate into the soil versus the microcosm with no persulfate added.

## Results

Table B-2 shows concentrations of TCA and TCE over time at the top and bottom of the microcosms with persulfate concentrations of zero g/kg, 2 g/kg, and 4 g/kg. Figure B-1 shows percent reductions of TCA and TCE over time at the top and bottom of the soil treatment pile microcosm with three different treatment options.

Table B-2 shows that initial time zero concentrations vary for different persulfate concentrations, with time zero TCA and TCE being the highest in the microcosm without the addition of persulfate, followed by the 4 g/kg microcosm and the 2 g/kg microcosm. The focus of the soil treatability study was to establish CVOC reduction rates over time with and without the addition of chemical oxidant. The different initial CVOC concentrations are not significant to making that determination.

Table B-2 and Figure B-1 show that TCE volatilizes somewhat more quickly than TCA, and that contaminant concentrations are reduced more quickly from the top of the pile for both compounds. The majority of reduction in TCA and TCE occurred between 2 and 4 days after the initiation of the test and higher persulfate concentrations correlated to faster and more complete contaminant removal. Higher persulfate concentrations were notably better at removing TCA and TCE at the bottom of the soil treatment pile microcosm where soils were not exposed to the air.

The soil treatability study indicates that mixing and the addition of persulfate will be effective in treating design concentrations of CVOCs in excavation soils. The rate of CVOC reduction will be dependent on thorough mixing of the chemical oxidant and soils in the treatment pile as a whole. The only soil treatment microcosm with relatively high concentrations of CVOCs after 14 days was the unmixed soil from the bottom of the pile that has no persulfate added; 1,430 µg/kg for TCA and 798 µg/kg for TCE. With 2g/kg persulfate, these concentrations dropped to 206 µg/kg for TCA and 36.3 µg/kg for TCE.

## Conclusions and Recommendation

The soil treatability study demonstrates that much of the reduction in TCA and TCE concentrations occurs during the initial 2 to 4 days. Actual TCA and TCE concentrations in excavation soils as a whole are expected to be lower than the initial spike concentrations in this study. Careful and thorough mixing of the pile with 2 to 4g/kg of persulfate should reduce CVOC concentrations below target treatment concentrations in a 14-day treatment period designed for the project.

**Table B-1. Soil Treatability Study**  
*ATI Wah Chang; Albany, Oregon*

**TCA and TCE Concentrations  
in Pre-design Boreholes**

**August 3, 2015**

| Borehole Location       | Sample Depth Interval (feet) | 1,1,1-Trichloroethane Soil Concentration (µg/kg) | 1,1,1-Trichloroethene Soil Concentration (µg/kg) |
|-------------------------|------------------------------|--|--|
| NW Corner of Excavation | 0-8                          | 470  | ND   |
|                         | 8-11                         | 1800   | ND   |
|                         | 11-14                        | 26000  | ND   |
| SW Corner of Excavation | 0-7.5                        | 540  | ND   |
|                         | 7.5-10                       | 46   | ND   |
|                         | 14-16                        | 21   | ND   |
| SE Corner of Excavation | 0-5                          | 10   | ND   |
|                         | 9-12                         | 730  | 6.6  |
|                         | 12-15.5                      | 100  | ND   |

**Notes:**

TCA = 1,1,1- trichloroethane

TCE = 1,1,1-trichloroethene

µg = microgram

kg = kilogram

NW = northwest

SW = southwest

SE = southeast

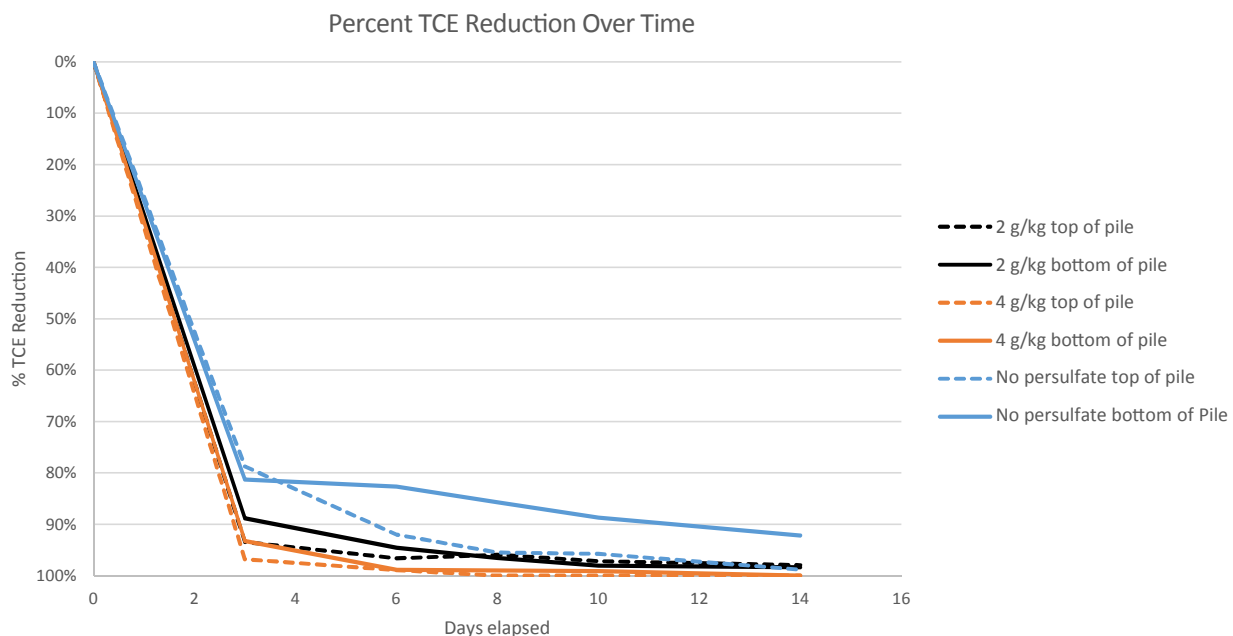
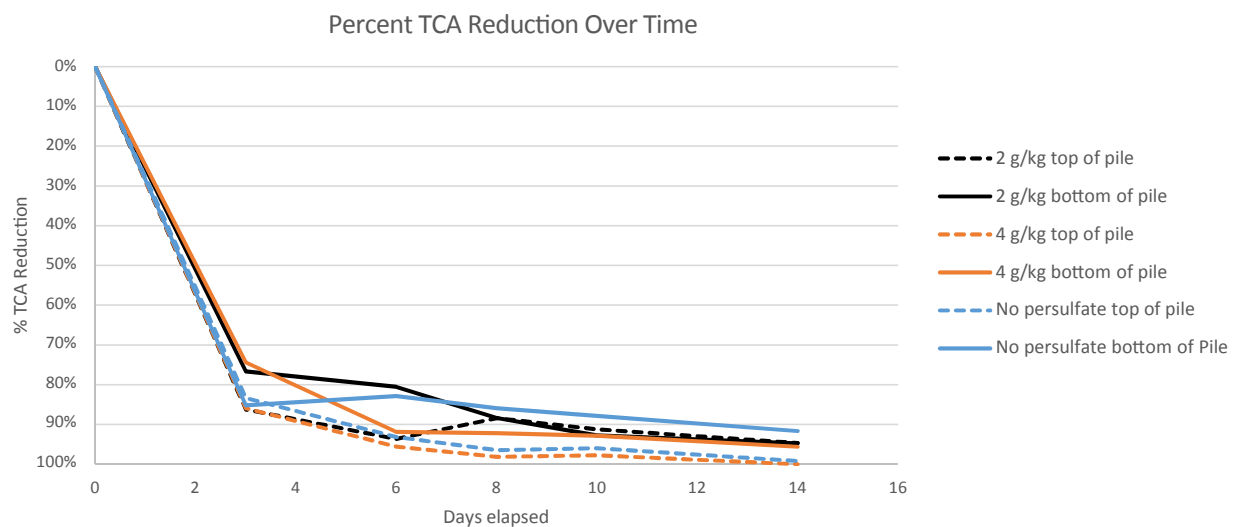
**Table B-2. Soil Treatability Study**  
*ATI Wah Chang; Albany, Oregon*

**TCA and TCE Concentration Reductions over Time  
 with Varying Concentrations of Activated Sodium Persulphate**

| Persulfate                                  | None        |                | 2 g/kg      |                | 4 g/kg      |                |
|---|-------------|----------------|-------------|----------------|-------------|----------------|
| Sample Location                             | Top of Pile | Bottom of Pile | Top of Pile | Bottom of Pile | Top of Pile | Bottom of Pile |
| <b>TCA Concentrations Over Time (µg/kg)</b> |             |                |             |                |             |                |
| 10-27-15                                    | 12900       | 17100          | 3040        | 3900           | 5320        | 4570           |
| 10-30-15                                    | 2150        | 2540           | 419         | 911            | 752         | 1170           |
| 11-2-15                                     | 883         | 2940           | 194         | 759            | 238         | 373            |
| 11-4-15                                     | 457         | 2410           | 353         | 457            | 101         | 359            |
| 11-6-15                                     | 523         | 2080           | 267         | 282            | 122         | 328            |
| 11-10-15                                    | 105         | 1430           | 163         | 206            | <59.5       | 201            |
| <b>TCE Concentrations Over Time (µg/kg)</b> |             |                |             |                |             |                |
| 10-27-15                                    | 7250        | 9760           | 1910        | 2220           | 2880        | 2630           |
| 10-30-15                                    | 1540        | 1830           | 125         | 248            | 91.7        | 178            |
| 11-2-15                                     | 578         | 1700           | 64.9        | 120            | 30          | 30             |
| 11-4-15                                     | 324         | 1400           | 78          | 76.5           | <28.2       | 27.3           |
| 11-6-15                                     | 309         | 1110           | 54.3        | 43.3           | <30.5       | 23.6           |
| 11-10-15                                    | 84.7        | 768            | 39.2        | 36.3           | <59.5       | <20.1          |

|  |
|--|
| <p><b>Notes:</b></p> <p>TCA = 1,1,1-trichloroethane</p> <p>TCE = 1,1,1-trichloroethene</p> <p>g = grams</p> <p>kg = kilograms</p> <p>µg = micrograms</p> |
|--|





**NOTES:**

TCA = 1,1,1-trichloroethane  
TCE = 1,1,1-trichloroethene  
g = gram  
kg = kilogram  
Oxidant = activated sodium persulfate

**TCA and TCE Reduction in Acid Sump Soils after Treatment with Persulfate**

Soil Treatment Study  
ATI Wah Chang - Albany



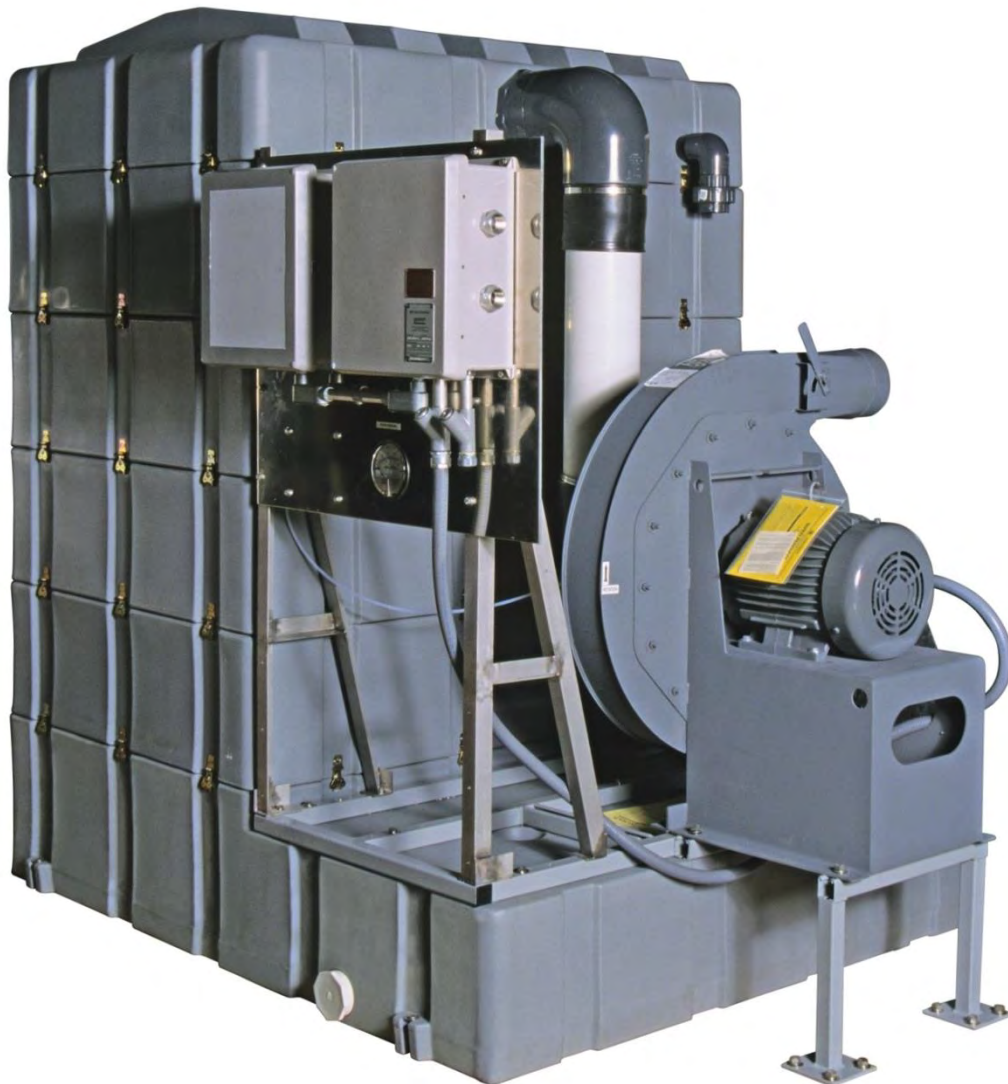
**Appendix C**

Groundwater Component Specifications and CVOC Removal Efficiency

# LO-PRO III

## Low Profile Air Stripper

### Installation and Operation Manual





## Table of Contents

|  |    |
|--|----|
| Section 1: System Description .....                | 3  |
| Section 2: System Installation .....               | 12 |
| Section 3: System Operation .....                  | 19 |
| Section 4: System Maintenance .....                | 21 |
| Section 5: System Troubleshooting .....            | 29 |
| Section 6: System Specifications .....             | 35 |
| Section 7: System Schematic .....                  | 38 |
| Section 8: Replacement Parts and Accessories ..... | 39 |
| Appendix A: Decontamination Procedures .....       | 41 |
| Warranty and Repair .....                          | 44 |



# DOCUMENTATION CONVENTIONS

This document uses the following conventions to present information:



**WARNING**

An exclamation point icon indicates a **WARNING** of a situation or condition that could lead to personal injury or death. You should not proceed until you read and thoroughly understand the **WARNING** message.



**CAUTION**

A raised hand icon indicates **CAUTION** information that relates to a situation or condition that could lead to equipment malfunction or damage. You should not proceed until you read and thoroughly understand the **CAUTION** message.



**NOTE**

A note icon indicates **NOTE** information. Notes provide additional or supplementary information about an activity or concept.

# Section 1: System Description

## Function and Theory

The Low Profile Air Stripper III (LO-PRO III) is a cost-effective, modular system designed for the efficient removal of volatile organic compounds from groundwater. The LO-PRO III is compact and unobtrusive and can be discreetly integrated into any site landscape. The modular construction of the system makes it easily adaptable to changing conditions and requirements. By simply adding or subtracting aeration trays, the LO-PRO III can be fine-tuned for different influent concentrations and removal efficiencies. Figure 1-1 shows a standard three-tray system. Figure 1-2 is an example of a LO-PRO III system with optional equipment components.

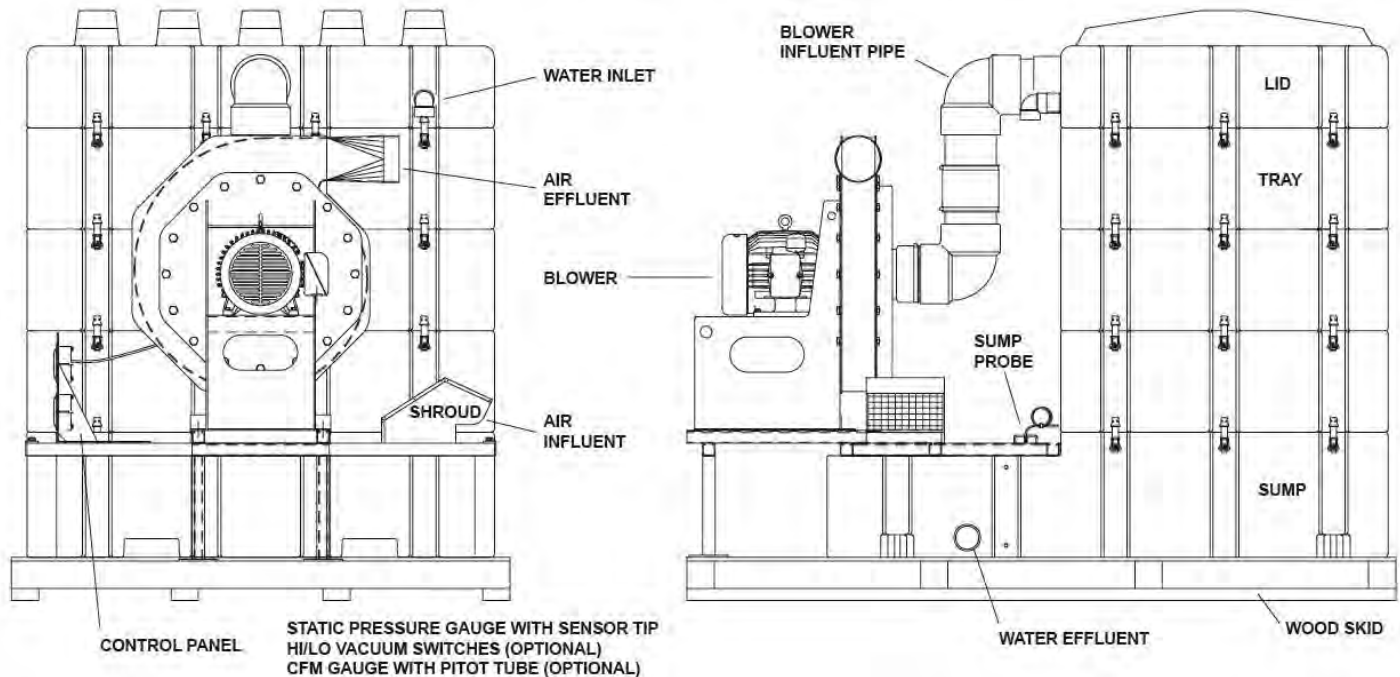


Figure 1-1 – Example of a LO-PRO III with five trays.

The standard LO-PRO III system consists of a 187 gallon (708 liter) sump with integral floor mounts, three to five aeration trays with integral gaskets and latches, a lid (cover) with mist eliminator, a 10HP blower, and a static pressure gauge. Each aeration tray consists of an alternating, stainless steel bubble plate with attached downcomer for funneling water. The sump, trays and lid are constructed of low density polyethylene. PVC pipe is used for all external plumbing and fittings. Refer to Section 8 for a list of parts and optional equipment. See Section 4 for more information on unit maintenance and tray orientation.



Sump capacity is based approximately on the dimensions of the sump to the height of the water HI OVERRIDE switch (blue float) of the sump probe. When activated the HI OVERRIDE switch will shut off the influent water pump, preventing the sump from over-flowing. During normal operation, the HI LEVEL switch (orange float) will turn on the effluent transfer pump and empty the sump (of approximately 75 gallons or 284 liters) or until the LO LEVEL switch on the probe is reached. See also the probe diagram in Figure 1-5.

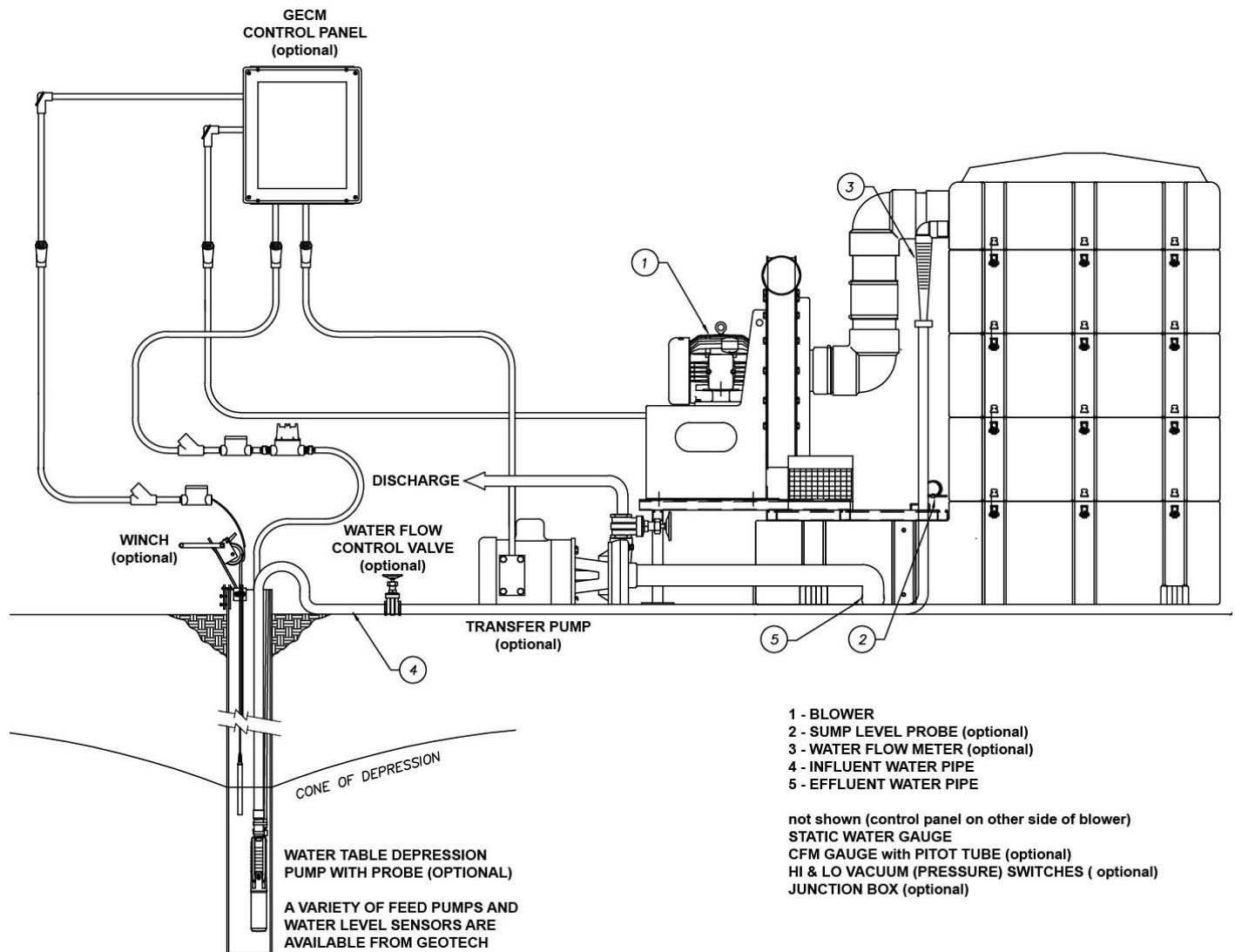


Figure 1-2 - LO-PRO III system deployed with optional GECM Control Panel, Transfer Pump and Water Table Depression Pump.

## The LO-PRO III(S) System

The LO-PRO IIIS is a freestanding, integrated system designed to operate under the rigorous demands of continuous duty air stripping, but requiring minimal installation and field wiring. Operation of LO-PRO IIIS components is controlled with an optional GECM Control Panel at the remediation site, which can also allow remote monitoring of site activity.

The LO-PRO IIIS utilizes most of the equipment options offered by Geotech. Pre-wired and plumbed equipment includes a panel stand that supports the GECM Control Panel, which contains the system motor starters, protection circuits, and vacuum control accessories. The GECM is also designed to control the effluent transfer pump with input from the sump level probe, as well as the influent pumps and probes when configured accordingly.

## **Theory of Operation**

All air stripping systems take advantage of the fact that many hydrocarbon contaminants such as benzene, toluene and xylene can be volatilized when exposed to an air stream. These systems work by maximizing contact between air and the contaminated water to be treated causing the molecules of volatile contaminants to diffuse from the water into the air, which is then carried away.

### **Removal Efficiency**

Removal efficiency is the difference in contamination level between the influent and effluent water streams. This difference is usually expressed as a percent.

For example, when the influent concentration of BTEX is 3000 ppb (parts per billion) and the effluent concentration is 3 ppb, the removal efficiency for BTEX is 99.9%. Removal efficiency is determined by two major system parameters; air/water ratio and water residence time.

### **Air/Water Ratio**

Air/water ratio is the volume of air being pulled through the system per volume of water being treated. In practical terms, the air/water ratio is the CFM/CMM generated by the blower divided by the influent water flow rate in CFM/(GPM x .1337) or CMM/(LPM x 17.92). Looked at in another way, the air/water ratio is a measure of the amount of contact that takes place between air and water at any one moment in time.

### **Residence Time**

Residence time is the length of time a given water molecule remains in the system from the time it enters the top of the air stripper until it falls into the sump. The longer the residence time the greater the potential for removal of volatile contaminants. In conventional packed tower air strippers, residence time is determined by the height of the tower and the water flow rate. In bubble plate air strippers like the LO-PRO III, residence time is a function of flow rate and the number of trays being used.

Multiplying the air/water ratio by residence time gives a measure of removal efficiency or the total amount of aeration experienced by a molecule of contaminated water as it passes through the system.

### **Packed Towers**

In conventional packed tower air strippers, contaminated water cascades down through a tower filled with packing medium that exposes large surface areas of the water to an up pushing air stream. To obtain high removal efficiencies from such systems, packed towers as tall as 30 ft. (9 m) or 40 ft. (12 m) are sometimes required. This is because water residence time per unit packed towers is quite brief. Towers must therefore be tall to allow time for adequate stripping of contaminants.

In contrast, the LO-PRO III Air Stripper uses a unique multi-stage counter-flow aeration system that requires no packing medium and yields removal efficiencies of up to 99.99% from a unit that stands less than nine feet high from top to bottom.

Figure 1-3 contains an example of the flow of air and water within the LO-PRO III system.

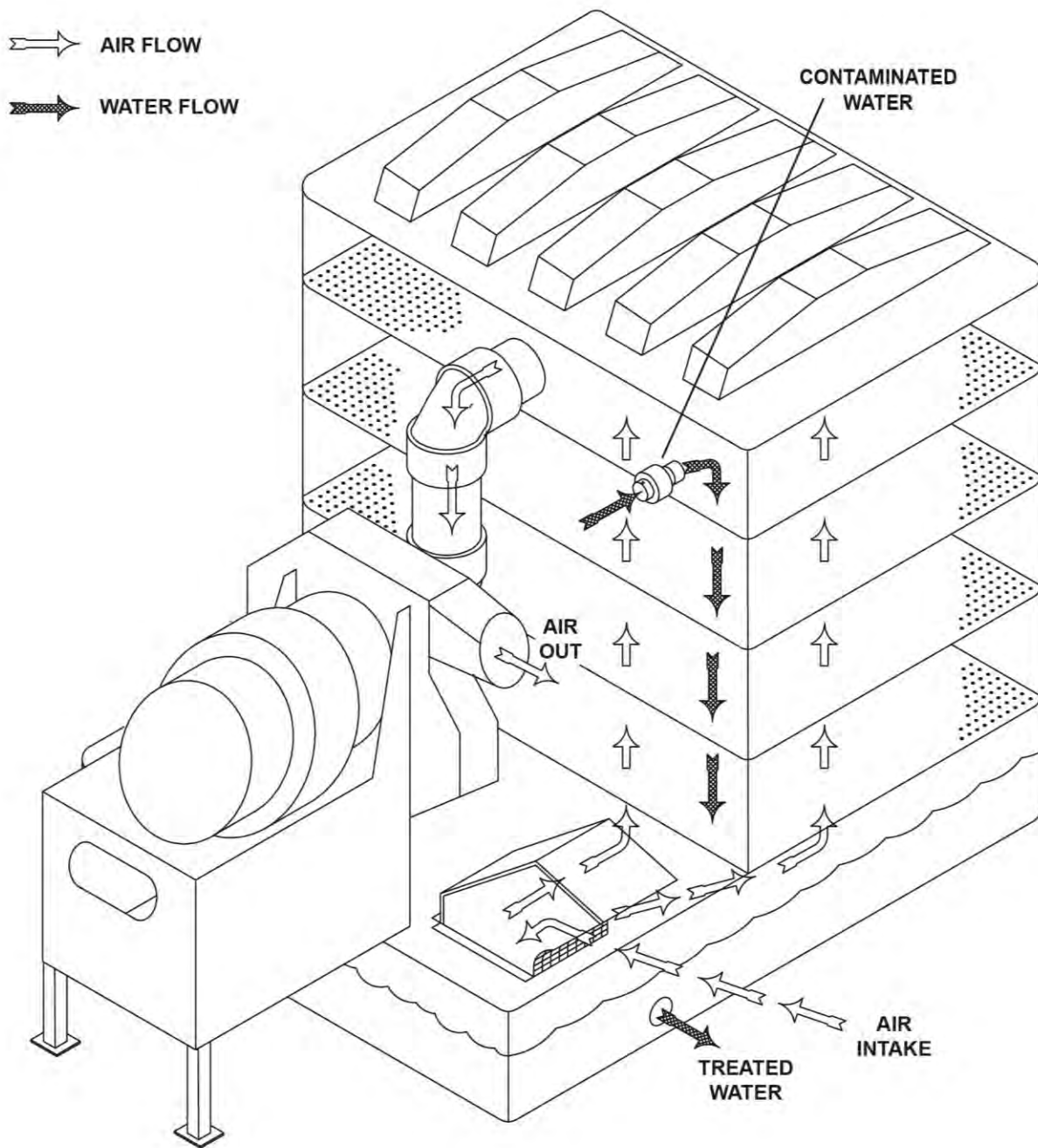


Figure 1-3 - Process Flow Diagram of the LO-PRO III Air Stripper.

Contaminated water enters the LO-PRO III at the top and slowly cascades down from tray to tray. While in each tray, the water is aerated by bubbles generated by the bubble plates mounted and sealed between each tray. The multi-stage counter flow design permits long water residence times and high efficiency stripping without the need for a tall packed tower.

## System Components

### Blower

The standard LO-PRO III uses a centrifugal blower to draw air through the bubble plates. The blower is mounted on a steel metal frame that also supports optional panels containing the following instrumentation: a standard Static Pressure Gauge, the optional HI and LO Vacuum (Pressure) Switches, and the optional CFM Gauge with filter. Explosion proof blowers are available for use in Class 1, Div. 1, Group C & D hazardous locations.



The optional GECM Control Panel is equipped with thermal overload connections when this feature is provided by the blower manufacturer.

### Sump

The sump is 72" (183 cm) long, 60" (152 cm) wide and 16" (41 cm) high and is constructed of low density polyethylene (LDPE). It serves both to collect treated water and to support the aeration trays, blower assembly, and panel stands. Also molded into the exterior of the sump is an intake hole, a hole for the optional sump probe, threaded holes for a sight tube, and threaded holes for NPT fittings to attach water effluent pipe.

### Aeration Trays

The trays are constructed of LDPE and are molded for vertical stacking on top of the sump. They are secured to one another and to the sump by quarter turn fasteners. Flexible gaskets on the mating surfaces assure an air and water tight fit between trays. The stainless steel bubble plates are designed to be sandwiched between successive trays. This provides for easy removal efficiencies and can be adjusted by changing the number of trays used with the system. The trays are 42" (107 cm) deep, 60" (152 cm) wide and 13" (33 cm) high.



Alterations to LO-PRO III tray configurations will require changes to the bubble plate orientation and possibly the blower type. Consult with a Geotech Sales representative prior to modifying your existing unit.

### Lid (or Cover)

The lid contains the polypropylene mist eliminator and fits on the top of the LO-PRO III unit. Constructed of LDPE, the cover is equipped with fittings for attachment of the influent water and effluent air plumbing.

### Static Pressure Gauge

A static pressure gauge is provided to measure the difference between ambient air pressure and the pressure generated inside the system. The gauge reads in inches of water column and is connected by FEP tubing to a static sensor tip mounted in the blower influent air pipe.

## Optional Components

Although the standard LO-PRO III can be plumbed, wired and operated as delivered, the benefits of the system can be greatly enhanced by the addition of the optional accessories described in the following pages. Figure 1-2 shows a typical water treatment installation using a fully optioned LO-PRO III.

### GECM Control Panel

The GECM Control Panel (shown in Figure 1-4) is a microprocessor based controller designed to simultaneously control the LO-PRO III along with an optional transfer pump and/or feed pump. The controller is housed within a weatherproof NEMA 4 (IP 66) enclosure and incorporates circuitry to receive sensor input from optional vacuum switches and sump probe. The GECM is fully instrumented and includes a display that provides a visual indication of the equipment status.



Figure 1-4 – GECM Control Panel (shown with options)

In addition to coordinating operation of the LO-PRO III blower and its transfer pump or feed pump, the GECM panel can be configured to shut down the blower, water pump or interconnected equipment in the event of an alarm condition affecting any part of the system. For example, if the optional LO Vacuum Switch detects a blower failure, the panel will shut off the feed pump before untreated water can pass through the system.



Because the GECM Control Panel requires sensor input for sump water level and system vacuum, Geotech strongly recommends that the optional sump probe, high vacuum and low vacuum switches be ordered whenever a GECM Control Panel is being used with the LO-PRO III.



In addition, the GECM Control Panel also has connections for blower motor thermals when provided by the manufacturer.

### **Motor Starters**

A variety of motor starter options are available to meet the requirements of the LO-PRO III blower and transfer pump. These components are easily installed to a GECM Control Panel or explosion proof enclosure as needed.

A separate motor starter is assigned to the blower and to the influent and effluent pumps. Motor starters come with an adjustable amp range set point and manual or automatic reset. The control panel is also wired to shut off the motor starter when thermal overload or vacuum switches are provided.

### **Sump Probe**

The LO-PRO III Sump Probe (Figure 1-5) monitors the water level within the sump and provides sensor input to the optional GECM Control Panel.

The probe is density actuated and uses separate floats to control feed and transfer pumps. The bottom float controls operation of the optional transfer pump by actuating HI and LO switches located on the probe shaft (see Figure 1-5). The pump starts when the HI/LO level float rises to the HI switch and continues to run until the water level drops the float to the LO switch. The 4 inch (10 cm) HI/LO range on the probe results approximately to a 75 gallon (284 liter) working sump capacity.

The top float actuates the HI OVERRIDE switch. If the sump should become full, the rising water level will lift this float and shut off the feed pump.

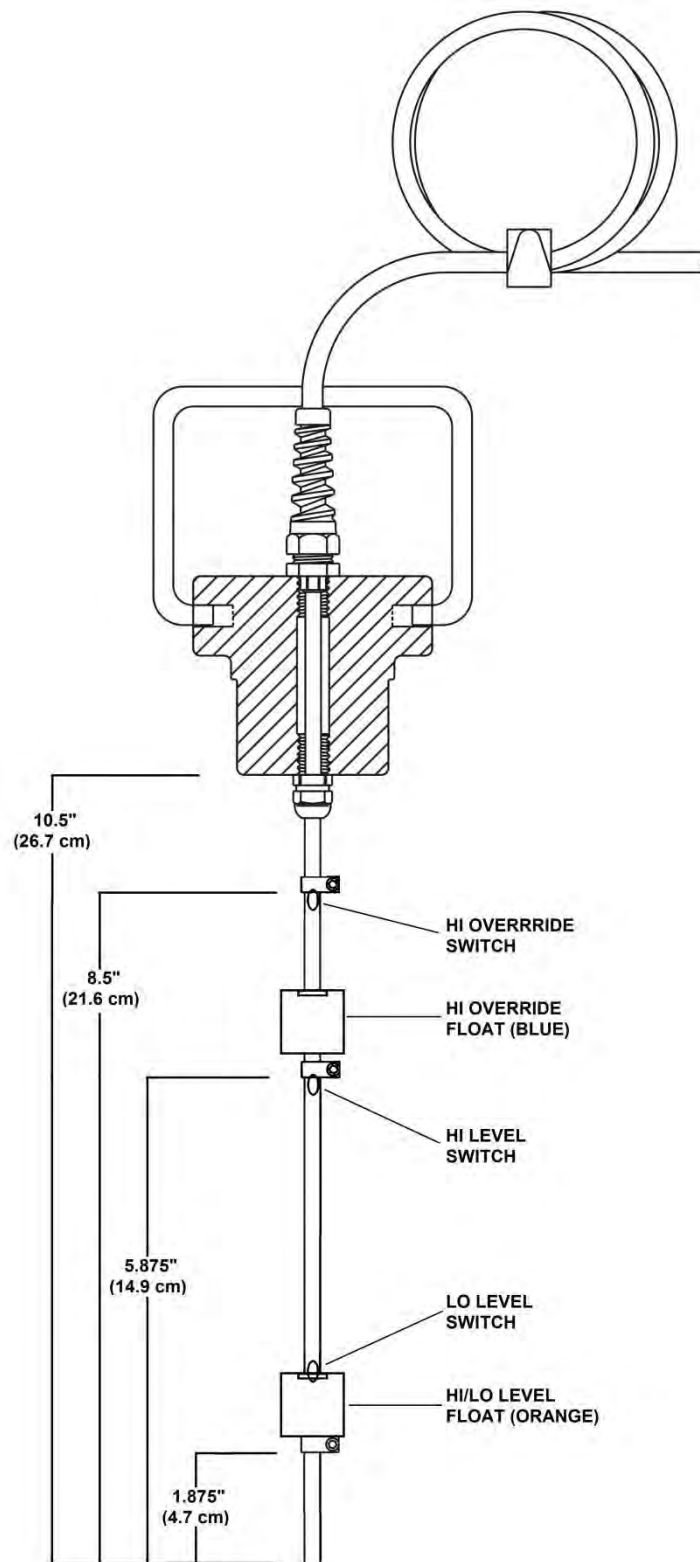


Figure 1-5 - LO-PRO III Sump Probe.

## **High and Low Vacuum (Negative Pressure) Switches**

High (HI) and Low (LO) Vacuum Switches are available to monitor the vacuum generated by the blower. In the event of a blower shutdown, the LO Vacuum switch signals the control panel to shut off the feed pump, thereby preventing untreated water from passing through the system.

If bubble plate fouling or water entrainment causes the vacuum in the system to rise, the preset HI Vacuum switch will signal the control panel to shut off the blower. This will reduce the possibility of water being pulled into the blower. At the same time, the LO Vacuum switch will initiate when the blower stops causing the feed pump to shut down also, thereby preventing untreated water from passing through the system.

HI and LO Vacuum switches are mounted to the lower backside of the black control panel so that they can be easily placed in line with the FEP tubing from the Static Pressure gauge before connecting to the Static Sensor Tip in the influent blower piping. Blue switch cabling will then connect to the optional Junction Box from which connection to a GECM Control Panel or other control source can be made.

See Section 4 for more information on the HI and LO Vacuum switches and their operation.

## **CFM (Air Flow) Gauge**

The optional Cubic Feet per Minute (CFM) gauge, with Pitot tube, air filter and FEP tubing, measures the volume of air passing through the LO-PRO III system. The gauge is equipped with an air filter to prevent moisture from accumulating in the gauge. CFM gauges are matched to the specifications of the blower and LO-PRO assembly. If this option is included, the Pitot tube is factory installed at a specific point along the effluent pipe between the blower and lid to ensure a correct flow reading on the gauge. Consult Geotech Sales when installing a CFM assembly to your system.

## **Water Flow Meter**

An optional water flow meter is available for mounting to the influent water connection on the LO-PRO III lid. The standard flow meter, also known as a rotameter, is a clear plastic flow meter with a weighted float that allows the operator to view water flow rate at the site. Other water flow measurement and monitoring options include flow totalizer with digital display of both gallons pumped and water flow rate; and remote monitoring of totalizer pulses are available and can be included with the GECM Control Panel. Geotech provides partial plumbing on the lid, with a 2" PVC slip fit union, so that a flow meter can be easily attached.

## **Transfer Pump**

Transfer pumps are surface mounted centrifugal pumps designed to move water from the sump of the LO-PRO III to a drain, storm sewer or secondary treatment system. Transfer pumps can also be controlled with the GECM Control Panel. See Figure 1-2 for a diagram of a typical LO-PRO III installation showing feed lines and transfer pump.

## Section 2: System Installation



The LO-PRO III must be installed, operated and maintained according to the procedures described in this manual. Failure to follow these procedures or to observe the Warnings and Cautions included in this manual may result in personal injury and will void the Standard Equipment Limited Warranty.



The standard LO-PRO III system is designed for installation and operation in a non-hazardous, non-classified location with intrinsically safe extension into a hazardous classified location. Geotech does not determine classification of a location. Check government regulations regarding hazardous area locations prior to installing your system.

Classification of location is subject to local jurisdiction enforcement of NFPA regulations. All installations should be performed in accordance with the National Electric Code (NEC) Handbook. Before deploying the LO-PRO II, confirm that the electrical service at the site is properly sized for the blower and/or optional GECEM Control Panel, and that it conforms to NEC and local codes.

### Unpacking

Unpack the LO-PRO III shipping crates. Depending on the height of the unit, the system components are generally shipped on two separate pallets. One pallet contains the sump with the bottom tray and blower already installed. The sump will be bolted to this pallet prior to shipment. The second pallet will contain the remaining trays and all plumbing.



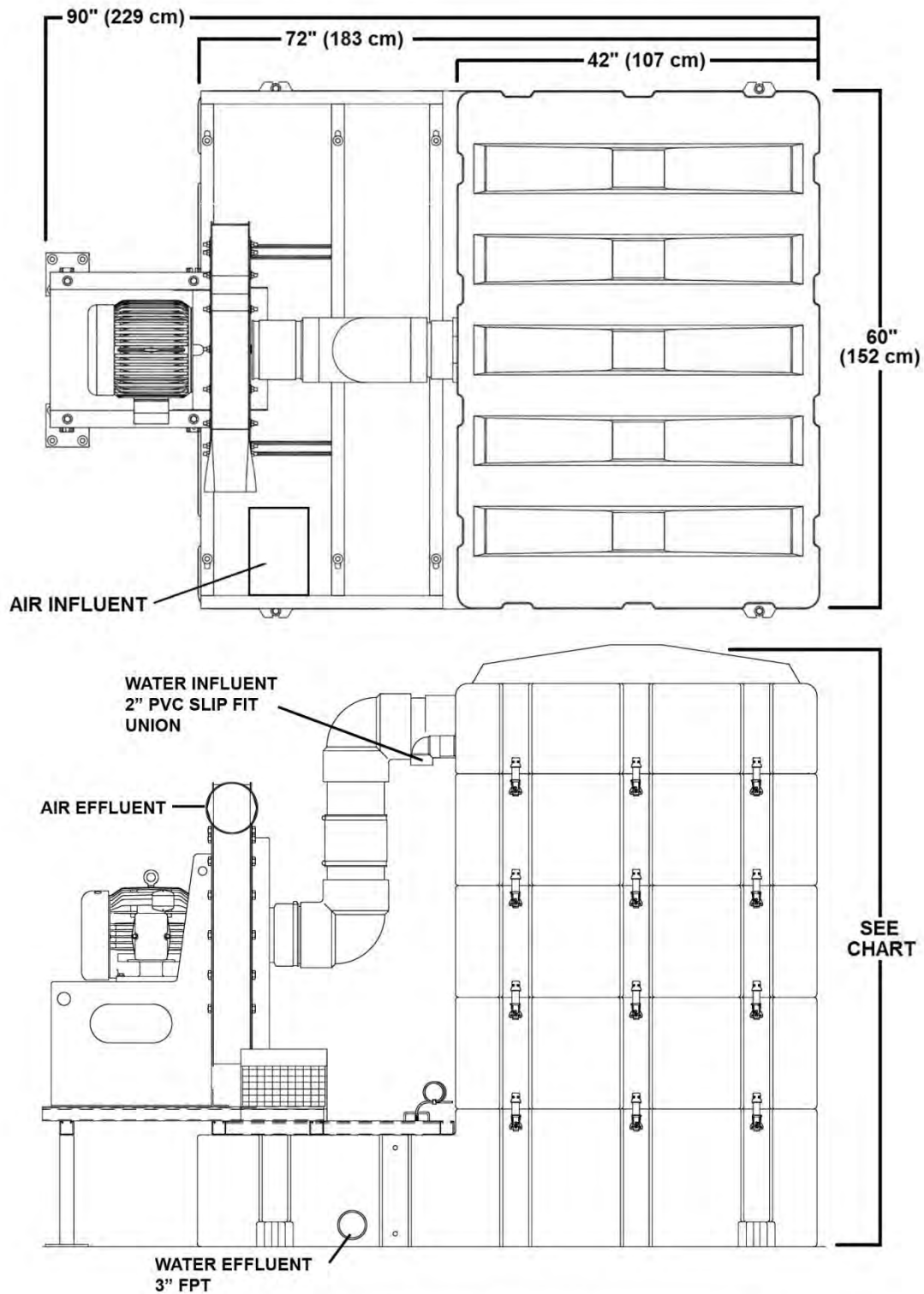
If the total height of the unit with pallet does not exceed the maximum shipping height of the transport truck, then the unit will be shipped completely assembled.

### Inspection

Inspect all equipment upon arrival. Check the contents of the packing crates against the Sales Order and the System Specification Sheet included with this manual. If any items are missing or damaged, make note of this on the shipping papers and immediately notify Geotech Environmental Equipment, Inc. in Denver, Colorado, USA at (800) 833-7958 or (303) 320-4764.

### Deployment

Throughout the following installation procedures, refer to Figures 1-2 and 2-1, and when applicable, the GECEM Field Wiring Diagram.



| TOTAL TRAY STACK HEIGHT |            |            |            |            |
|-------------------------|------------|------------|------------|------------|
| TRAY QTY.               | 2          | 3          | 4          | 5          |
| 13" (33 CM) TRAYS       | 57"/145 cm | 70"/178 cm | 83"/211 cm | 96"/244 cm |

Figure 2-1 - LO-PRO III plumbing hookup diagram showing system dimensions and influent/effluent fitting locations.

## Mount the Sump

Place the shipping pallet with sump on a flat level surface capable of supporting the entire system when filled with water. The filled weight of the sump is approximately 1525 lbs. (693 kg), while each aeration tray weighs approximately 128 lbs. (58 kg) when full. Given the additional weight of the blower and other system components, the total weight of an average 3-tray system is 2100 lbs. (955 kg).



Leveling the sump is important: the LO-PRO III will function properly only if the tray stack is plumb.

## Stacking the Trays

The sump will be shipped with the first (bottom) tray (along with bubble plate and downcomer) pre-mounted and properly oriented. Depending on the height of the unit, the system may be completely assembled and ready to go upon arrival.

Carefully record the orientation of the bubble plate that is mounted between the sump and the first tray. Each bubble plate has a transfer duct (or downcomer) attached. The remaining trays are then stacked so that the positioning of these downcomers alternate from one side of the bubble plate to the other. Tray orientation will be correct upon receipt, but it is good to record the orientation should the unit be disassembled for cleaning.

The key to proper tray stacking is as follows: If the unit has an even number of trays (not counting the lid), then the first bubble plate is to be placed with the downcomer towards the front (or blower side) of the unit. If there is an odd number of trays then start the downcomer towards the back by flipping the bubble plate over and re-installing the downcomer.

Trays are to be stacked individually to assure that each bubble plate is centered on top of the tray before placing the next higher tray. Stack the remaining trays and bubble plates on top of the sump and place the lid onto the top tray.

The downcomer openings are to face to the right (as you look at the unit from the blower side). The objective to alternating the downcomers is to evenly distribute the flow of water through the system and to end up with the last bubble plate's downcomer placed towards the back of the unit. When the lid is attached the influent water connection will not pour directly into an open downcomer, bypassing the first bubble plate. (A bubble plate is not installed between the top tray and lid.)

The bubble plate used on the LO-PRO III is universal and can be flipped over to place the downcomer towards the front or back. Because of this trays can be added or removed and the bubble plates re-arranged accordingly. The first downcomer installed to the sump is taller than the rest.

Ensure all trays are aligned before locking the clamps in place.

## Install the Lid

Verify that the water catch basis is secured to the front, right side of the last tray with two screws. The basis is for catching the influent water stream. Verify that the internal plumbing on the lid is set at 45 degrees to the outside (or towards the water catch basin) when the lid is in place. The mist eliminator will already be strapped to the lid from the factory. Ensure the lid is aligned to the top tray before locking the clamps in place.

## Install Plumbing

1. If not connected, install the blower influent pipe between the 3" unions on the lid and blower.
2. Connect the influent water line and optional flow meter to the 2" slip fit union on the lid.
3. Run an effluent water pipe from the sump to a suitable receptacle or to a transfer pump for discharge to another location. Two 3" FPT ports are provided on the sump for attachment of an effluent water pipe. These ports are located on opposite sides of the sump. Check local codes before plumbing effluent pipe.

## Air Intake

The LO-PRO III comes with a screened air intake shroud. A mating flange can be installed when necessary to run ducting to an external air source.

## Connect Exhaust

Make any necessary exhaust connection to the fan "Air Out" opening on the blower. Route exhaust air to a separate collector or as required by local codes.

## Wiring



All wiring must be carried out by a qualified electrician and be in accordance with government codes.

## Wire Blower

The LO-PRO III is normally equipped with a 10HP, TEFC, 230/460 VAC, 3 phase blower. The blower can be wired directly to a local power source it can be operated and controlled with the optional GECM Control Panel.



When the blower is wired directly to a local power source, thermal overload protection (when accompanying the blower electrical) needs to be properly wired to the motor starter by a qualified electrician.

Because each GECM is unique to the system(s) they operate, Geotech provides the customer with a GECM Field Wiring Diagram showing all wiring connections between the GECM and the system. The GECM panel is equipped with latching overload protection that will prevent the blower motor from restarting until the panel control switch is manually reset.



## Wire Sump Probe & Vacuum Switches (optional)

If your LO-PRO III is equipped with the optional sump probe and HI/LO vacuum switches, the leads from these components will be wired into a junction box mounted to the system control panel. The customer must wire from the junction box to the control panel (Figure 2-3) or as shown in the GECM Manual or GECM Field Wiring Diagram. Figure 2-4 shows an example of the interior of a standard LO-PRO III junction box.

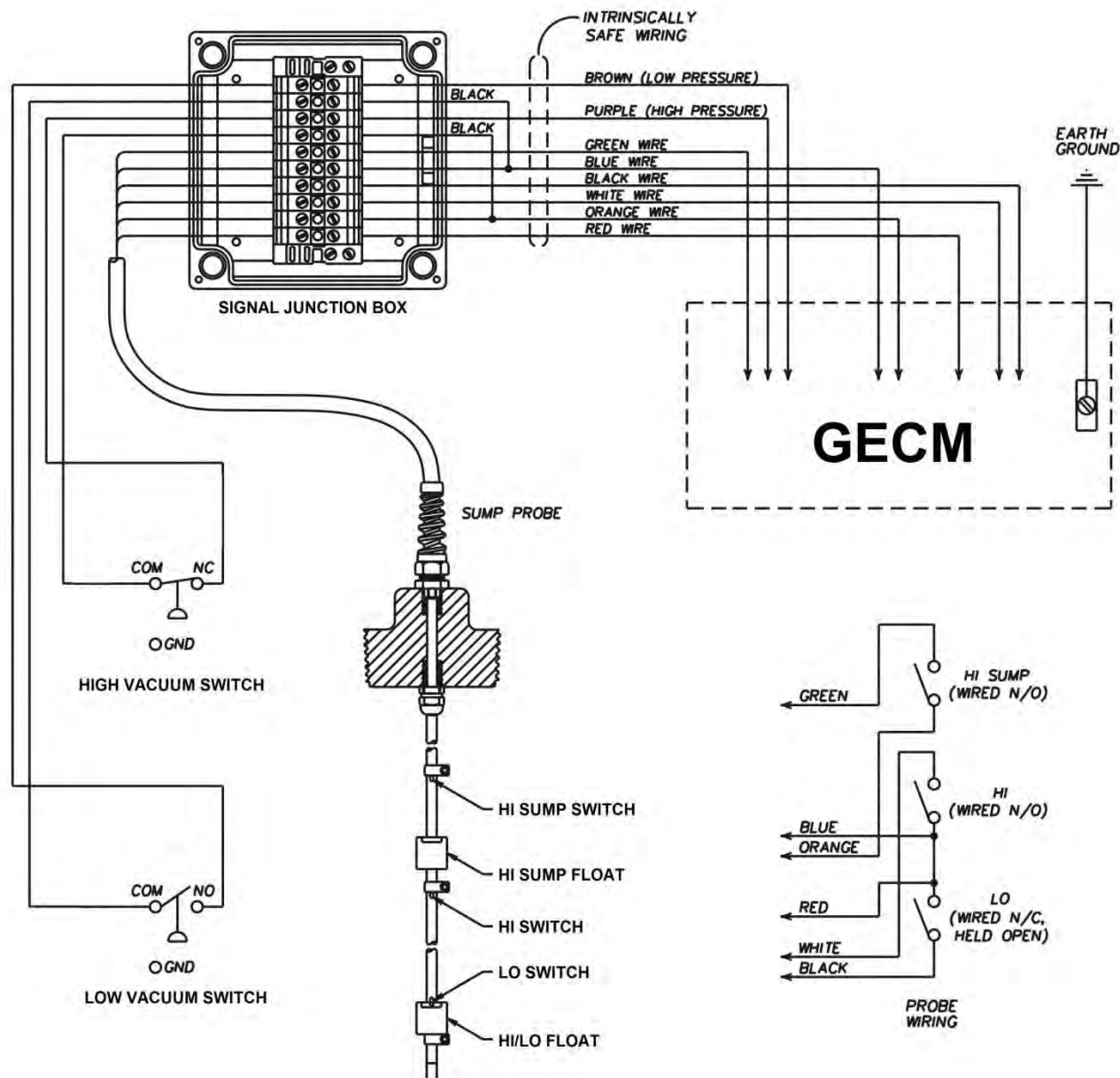


Figure 2-3 - Wiring Diagram for the LO-PRO III sump probe and HI/LO vacuum switches. Refer to the GECM Manual or GECM Field Wiring Diagram for connections to the GECM Control Panel.

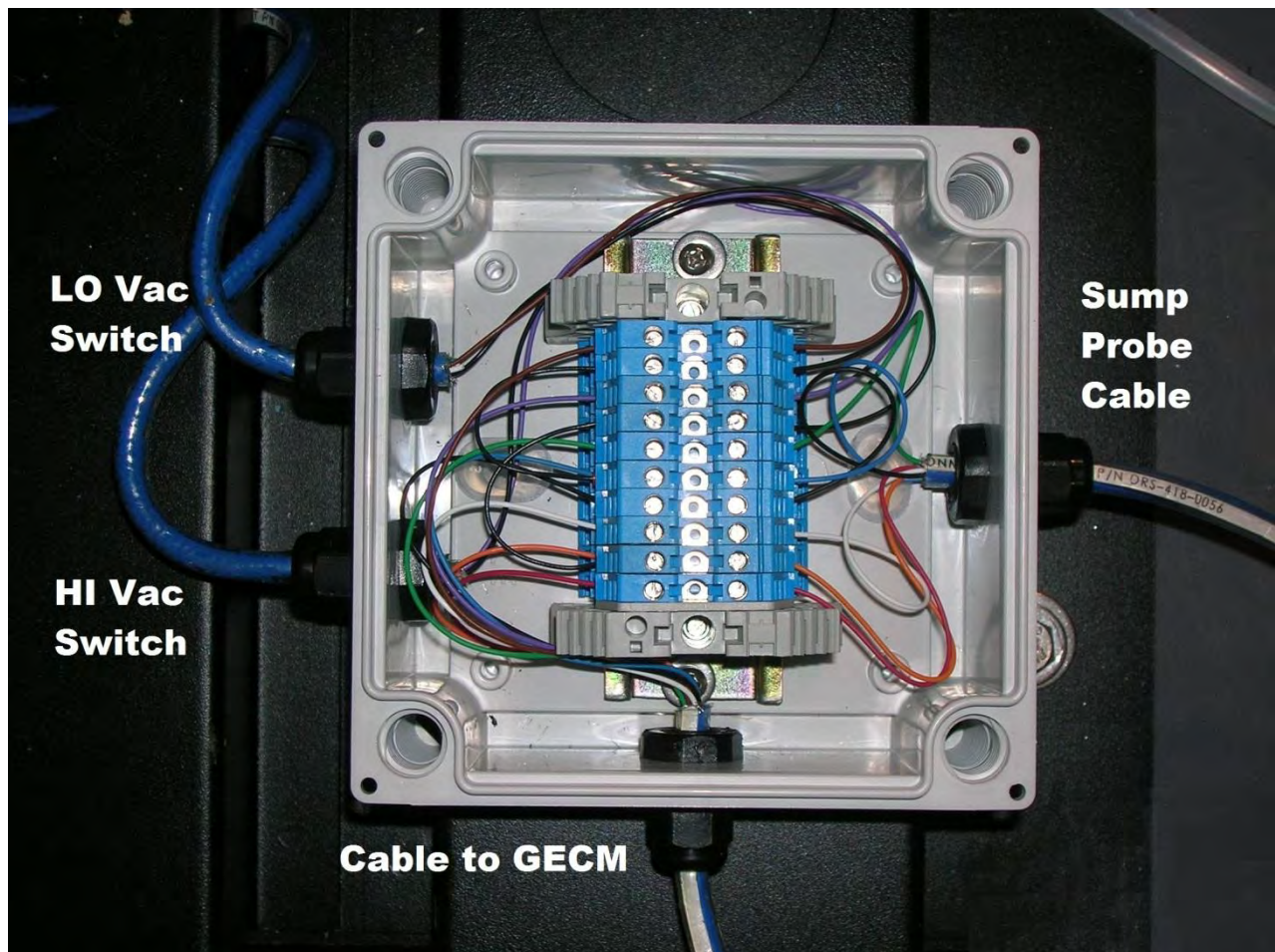


Figure 2-4 - LO-PRO III junction box with HI/LO Vacuum switch and sump probe wiring plus cable connection to optional GECM Control Panel.

### Connect CFM Gauge (optional)

If your system is equipped with the optional CFM gauge, use the flexible FEP tubing provided to connect the gauge to the Pitot tube. Both the gauge and the Pitot tube are equipped with push-in fittings. When cutting and fitting the flexible tubes, ensure that they are not cut so short as to cause binding or kinking. Tubing should gently hang between both points and away from the blower body.



The tubing must be installed as shown in Figure 2-5.

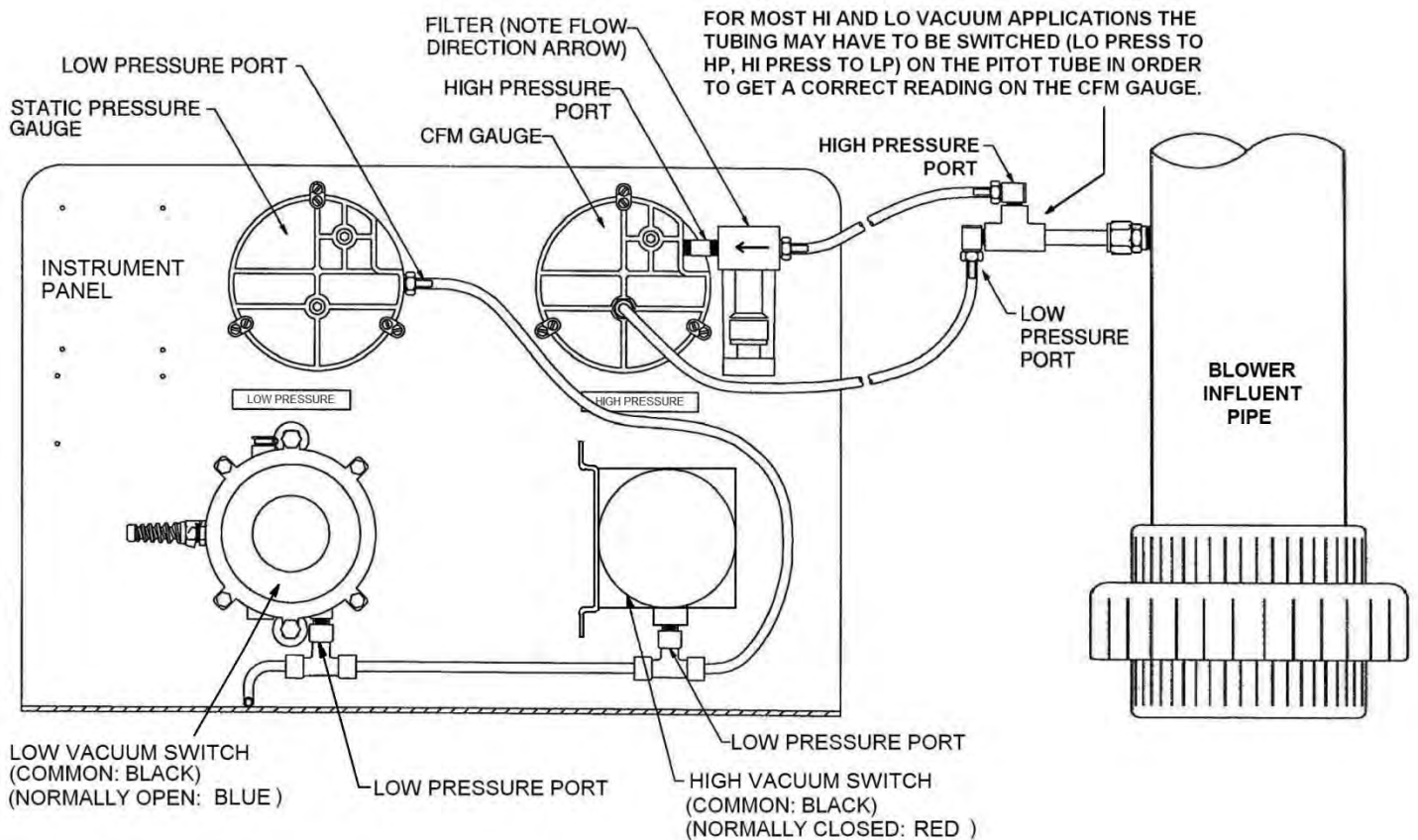


Figure 2-5 – Air lines and Pitot tube connection to the CFM gauge.



Not all CFM gauges are designed to work with all Pitot tubes. Readings can be off when mismatched. Consult Geotech for the correct application. Tubing connections between the CFM gauge and Pitot tube may need to be reversed for proper function. Ensure that both levers on the Pitot tube are open.

### Install Flow Meter (optional)

If your system includes a flow meter, it must be installed in-line with the influent water source and in a vertical plane to ensure accuracy. Thread tape all fittings and hand tighten the connections. Over tightening can crack the flow meter.

### Install Transfer Pump (optional)

To install a transfer pump with the LO-PRO III, refer to the separate GECM Field Wiring Diagram and to the paperwork provided with the transfer pump. Refer to Figure 1-2 for an example of a LO-PRO III installed with a transfer pump. Effluent connections at the pump can be made off the valve assembly at the top of the transfer pump. Plumbing considerations are dependent upon the site configuration.

## Section 3: System Operation

### Startup

Once installation has been completed the LO-PRO III is ready for startup. Proceed as follows:

1. Double check all electrical and plumbing connections.
2. Close the water flow control valve (if present).
3. Start blower and check air flow direction (blower rotation). If using three phase power a qualified electrician will need to adjust the leads.
4. With the water flow control valve slightly open, start the feed pump. Slowly open the water flow control valve until the desired flow rate is obtained.
5. Adjust the blower discharge blast gate so as to regulate the system current to the appropriate nameplate stated amps for the voltage.



If you are using a transfer pump and GECM, turn the control switch to AUTO before starting the feed pump. The transfer pump, in conjunction with the sump probe, will start when sufficient processed water has accumulated in the LO-PRO III sump.

### Operation

Once startup has been achieved, LO-PRO III systems equipped with the optional GECM Control Panel, sump probe and vacuum switches will function as shown in the system Process & Instrumentation Diagram (Figure 7-1).

- Secure blower blast gate position with the wing screw to insure the appropriate amp draw at startup.
- Record system static pressure at startup obtained from included static pressure gauge.

### Sump Probe

The optional controls enhance the efficiency and safety of the LO-PRO III system by coordinating the function of the blower, the feed pump and the transfer pump.

The sump probe monitors the water level in the LO-PRO III sump and signals the transfer pump (via the control panel) to switch the pump on and off in response to changes in water level. The probe also has a HI-OVERRIDE sensor that can shut off the feed pump if the water level in the sump rises too high and threatens to flood the blower.

### High Vacuum (Pressure) Switch

If bubble plate fouling or water buildup in the trays causes the total system vacuum to rise over a predetermined limit (approx. 30" (7.5 kPa) of water column for 10HP blowers and 35" (8.7 kPa) for 15HP blowers), the HI Vacuum switch will shut off the blower. This will prevent water from reaching the blower.

### Low Vacuum (Pressure) Switch

Should the LO-PRO III experience a power failure to the blower or have part of the vacuum tubing line cut, the system pressure will automatically fall below 1" (.3 kPa) to 2" (.5 kPa) of water column and the LO Vacuum switch will shut off the LO-PRO III control panel and feed pump. This will prevent untreated water from passing through the LO-PRO III system.

To restart the blower after it has been shut down by a LO or HI Vacuum condition, remedy the cause of the shutdown then turn the HOA switches for the blower and transfer pump on the GECM to OFF. Press the RESET button to clear the error then turn both switches back to AUTO.



If water intrusion into the blower piping is suspected, remove the effluent 6" pipe at the blower and empty the piping of all water before starting the blower.

## **Blast Gate**

The provided blast gate, located on the discharge side of the blower, is factory set to provide the appropriate amps of motor current with the dry systems. Geotech recommends resetting the blast gate to achieve the appropriate amps at the particular site of operation with water flowing through the system.



The amps will increase as the blast gate is opened. To avoid over-amping your system, always start with the gate half open. While using an amp probe on a power leg at the motor, adjust the gate for optimum air flow (30"/7.5 kPa for 10HP, 35"/8.7 kPa for 15HP) while monitoring the amps. Lock the blast gate in place after every adjustment.

## Section 4: System Maintenance

### Cleaning the LO-PRO III Unit

The LO-PRO III is designed for trouble free operation with minimal maintenance required. The modular design of the system permits easy disassembly for inspection and cleaning.



Material removed from the LO-PRO III bubble plates during cleaning should be collected and disposed of in accordance with government codes. It is the customer's responsibility to determine if minerals deposited by the groundwater must be treated as hazardous waste.



Always wear eye protection, gloves and proper clothing when performing maintenance procedures. Geotech recommends that the appropriate personal protective equipment for cleaning LO-PRO III trays should be at USEPA Level D Protection modified with splash protection as follows:

Hard hat with splash shield  
Splashguard goggles  
Waterproof coveralls  
Waterproof gloves  
Waterproof boots

At sites where toxic chemicals are present in the water being treated, upgraded Personal Protective Equipment (PPE) (e.g. air purifying respirator, chemical resistant gloves, etc.) may be required.

### Sump, Tray and Lid Cleaning Procedure



When performing regular maintenance, be careful not to damage the gaskets by placing or sliding the lid or trays on the ground or rough surface. A set of gaskets is glued to each tray and should be cleaned separately with a soft cloth. Replacement gasket kits can be obtained from Geotech.

The most common maintenance that may be needed on a regular basis will be the cleaning of the bubble plates. If the holes in the bubble plates begin to clog due to buildup of organic or inorganic material in the water, the HI Vacuum switch will repeatedly shut down the system. When this happens, it is recommended that the aeration trays, bubble plates and downcomers be disassembled and cleaned as follows:

1. Numerically mark the outside of the trays so that re-assembly will be easy. Do this for each bubble plate also so that the orientation can be properly restored when reassembled. When necessary, use the instructions outlined in Section 2, Stacking the Trays.
2. Disconnect the 6" PVC pipe from the lid and blower. Visually inspect the interior for debris and clean as needed.
3. Disconnect the union for the influent water connection. If using a flow meter, you may want to clean it while it is off the system.
4. Remove the lid, then remove the mist eliminator from the lid. Clean the lid and mist eliminator with hot soap and water. Inspect the internal PVC plumbing for any obstructions.



Degreasers such as phosphate free detergent and Simple Green can also be used in breaking up hydrocarbon build up on the interior parts.

5. Remove the trays and bubble plates. Clean all parts using a brush with hot soap and water. Rinse thoroughly. As you remove and clean each tray and bubble plate, set them aside in a row for easier reassembly.
6. With the trays off the sump, it is recommended that the interior of the sump be inspected and accumulated debris removed. This will also prevent any clogging of the transfer pump.
7. Inspect the screen on the influent air intake shroud and remove any debris from the screen.

### Mist Eliminator Maintenance

Clean the polypropylene mist eliminator on a regular basis. The required frequency of cleaning should be evaluated on a site by site basis, as frequency of cleaning is dependent on water chemistry and other factors. Figure 4-1 shows the location of the mist eliminator and retention hardware.

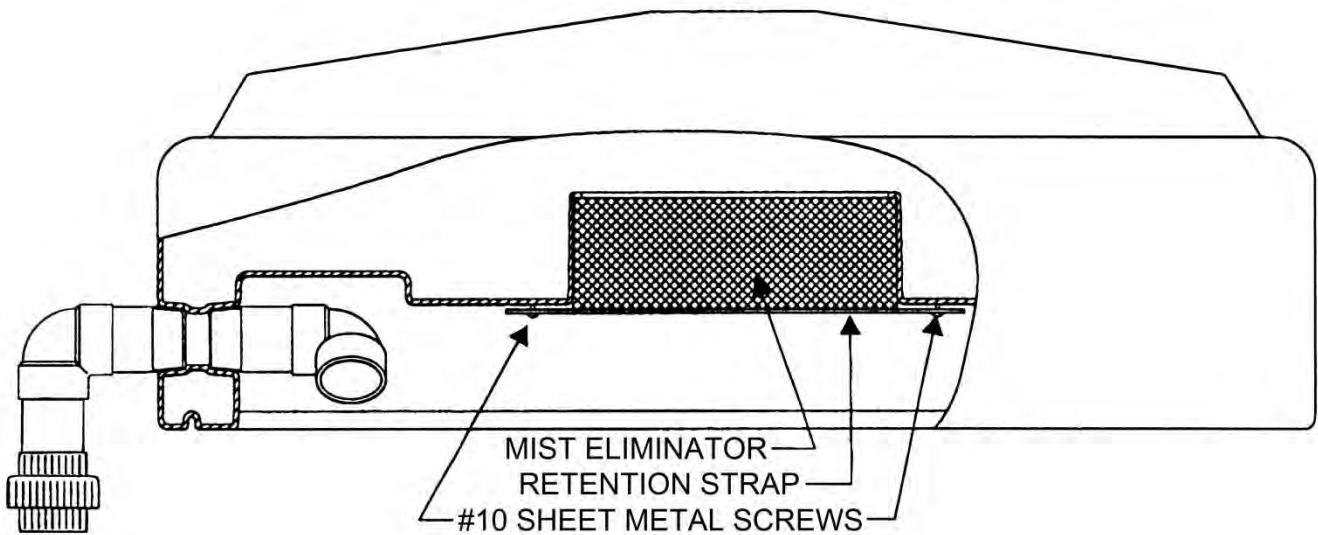


Figure 4-1 - The LO-PRO III mist eliminator.

1. Loosen the retaining clips and lift the entire lid assembly (cover) from the LO-PRO.
2. Remove the four (4) #10 sheet metal screws that secure the retention straps.
3. Pull the mist eliminator from the lid assembly.
4. Tap the demister against a sturdy surface to dislodge any large particles that are trapped within the mesh. When possible, completely soak the mesh and frame in a degreaser such as phosphate free detergent or Simple Green.
5. Rinse the mist eliminator with clean water and allow it to dry.
6. Replace the mist eliminator in the lid assembly and secure the retention straps with the screws.
7. Check and clean the influent water catch basin in the top tray.
8. Replace the lid assembly and tighten the retaining clips.



## Reassembling the Trays and Lid



When reassembling the LO-PRO II, be sure the gaskets are clean and have no tears or gaps to eliminate any potential air leaks between trays.



Refer to the instructions outlined in Section 2, Stacking the Trays, in conjunction with this section when re-assembling the LO-PRO III Trays.

Trays and bubble plates (with downcomers) need to be restacked to the sump in the order they were removed. Orientation of the bubble plates is critical also in that the downcomers attached need to alternate from front to back. One downcomer (the one attached to the bubble plate for the sump) is taller than the rest and must go with the first bubble plate. Figure 4-2 shows the two kinds of downcomers used on the LO-PRO III system. See Section 8 for a listing of part numbers.

The rule of thumb is to know where to place the downcomer opening for the first bubble plate – either towards the front or to the back. This is determined as follows:

If the LO-PRO III has an even amount of trays (4, 6), place the first downcomer toward the front (or blower side) of the unit and to the right side of the sump (as shown in Figure 4-3). If the LO-PRO III has an odd amount of trays (3, 5, 7), place the first downcomer towards the back. Then alternate the bubble plate openings and downcomers front to back. When attaching the lid, there will be no downcomer below the water influent plumbing.



Never stack downcomers over one another. All bubble plates and downcomers are to alternate front to back, with the last bubble plate downcomer in back.

As you stack each tray, look at the alignment from all sides before completely latching the tray into place.

Finally, attach the lid. Verify that the mist eliminator is clean and securely strapped to the center hole inside the lid. Set the internal plumbing of the lid to a 45° angle, or towards the water catch basin within the top tray, then place the lid on, center it, and latch it into place.

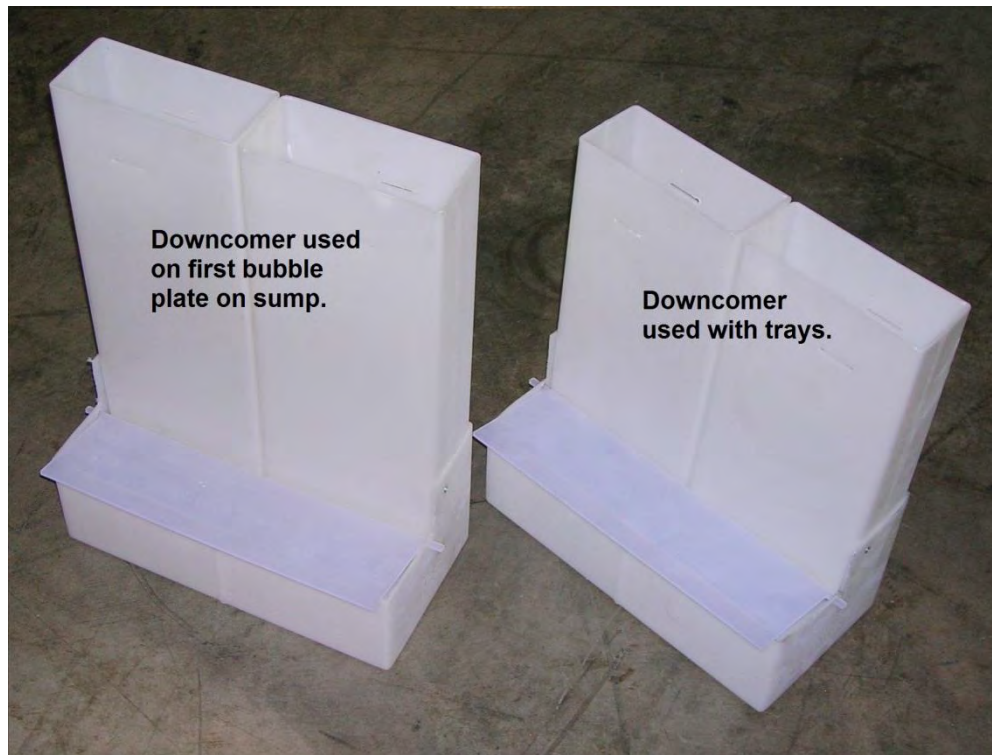


Figure 4-2 – LO-PRO III Downcomers



Figure 4-3 – First Bubble Plate on Sump

### **Clean Sump Probe**

On a regular schedule, remove and wash the sump probe in phosphate free detergent and hot water. This will prevent fouling that could lead to failure of the probe. The required frequency of cleaning is dependent upon water chemistry, temperature and other factors that must be evaluated on a site by site basis.

## Drain Vacuum (Pressure) Switches

The HI and LO Vacuum switches should be drained on a regular basis. This is particularly important in applications where excessive condensation may cause a buildup of moisture within the switch. To drain the switch, rotate the vent drain plug (underneath) one turn in a clockwise direction and then return the plug to its original position. See Figure 4-4.

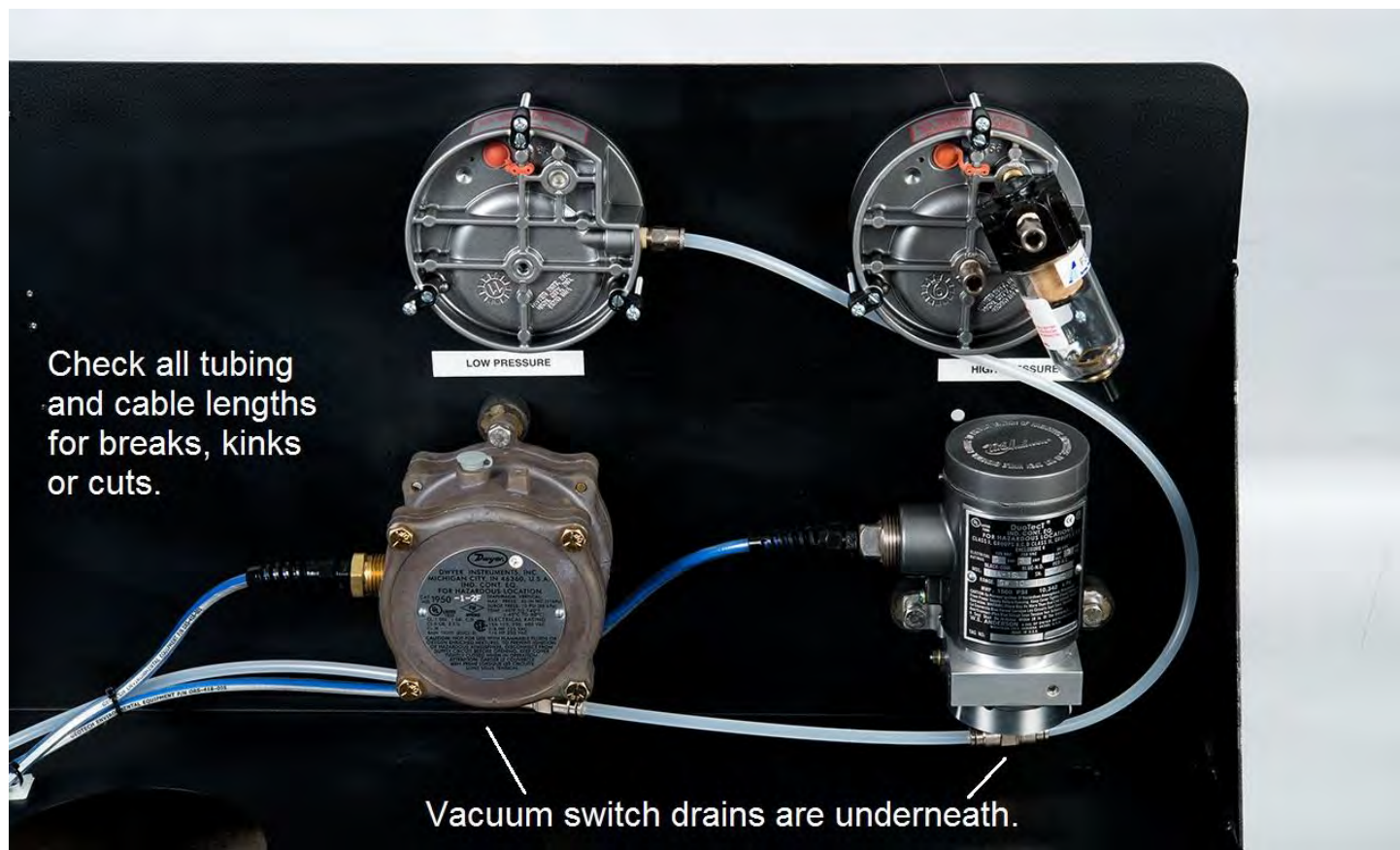


Figure 4-4 – Static Sensor Tubing between gauges and switches (CFM gauge tubing not shown)

## **Drain CFM Gauge Air Filter**

The filter on the CFM gauge should be checked on a regular basis and drained if necessary. Drain the filter by turning the drain screw (underneath) in a clockwise direction (when viewed from the bottom of the filter.) Close the drain by turning the screw counter-clockwise. See Figure 4.4.

## **Check FEP Tubing**

Regularly check the condition of the FEP tubing going from CFM gauge to Pitot tube and between the static pressure gauge, vacuum switches and static sensor tip in the influent piping. A cut, kink or loose tubing connection can cause operational problems with the LO-PRO III. See Figure 4-4.

## **Operation of the HI/LO Vacuum Switches**

Though the HI and LO vacuum switches are called out as "pressure" switches, and can be used as such, their application with LO-PRO III systems are to be used as "vacuum" (negative pressure) switches. When you see the word "pressure", assume "vacuum" unless the step is defining a physical port on the switch itself, in which case the word "pressure" is used.

### **LO-PRO III "HI Vacuum" (pressure) switch**

The HI vacuum switch used is always wired for "normally closed". The switch will remain closed until you adjust the vacuum setting screw to have the switch "open" at a specific vacuum (negative pressure) reading (in inches) on the Static Pressure gauge. This is achieved by turning the set screw clockwise (CW) for a higher setting, counter-clockwise (CCW) for a lower setting. When this setting is reached, the electrical contact will "open", breaking the circuit (and in most applications, shutting the system down).

### **LO-PRO III "LO Vacuum" (pressure) switch**

The LO vacuum switch used is always wired for "normally open". Once a measureable amount of vacuum (1"/.3 kPa to 2"/.5 kPa or greater negative pressure) builds up within the unit, the switch will close and remain closed until you adjust the vacuum setting screw to have the switch "open" at a specific lower vacuum. This is achieved by turning the set screw CW for a higher setting, CCW for a lower setting. The GECM is preset to allow enough time for this switch to close as the unit is powered up. The electrical contact will "open" when the lower vacuum setting is reached, breaking the circuit.

- It's called a pressure switch, but it all depends on how you plumb it to the system. The "HIGH PRESSURE" port is used for positive pressure readings, the "LOW PRESSURE" port is used for vacuum (negative pressure) readings.
- All switches are wired to be physically "closed" without pressure (vacuum) applied, except for the low pressure switch (which is wired "normally open" and immediately closes with the first sign of vacuum (negative pressure).
- The blower is basically "sucking" air through the LO-PRO III system, thus the "vacuum" reference.

## HI Vacuum Switch Setting

HI Vacuum switches are pre-set at the factory to not exceed 30" (7.5 kPa) Static Pressure on 10HP blowers or 35" (8.7 kPa) on 15HP blowers. The purpose of this setting is to maximize contact between the air and the contaminated water to be treated, as described in Section 1. Before proceeding with an adjustment, read the literature that came with the switch from the manufacturer.

When adjusting your HI Vacuum switch, use the following steps either to verify the current setting, or to make an adjustment to the HI Vacuum switch (such as after replacing a faulty switch):

1. Turn off the blower. Turn off the influent water to the lid.
2. Disconnect the 6" PVC influent pipe from the flexible coupling on the lid and tilt the pipe outward, clearing the coupling.
3. At the junction box remove the black and purple wires for the switch and attach an ohm meter to the ends of each wire. The ohm meter will show a "closed" circuit with the blower off.



If over-amping is a concern then it may be necessary to have an electrician open the blower motor electrical box and attach an amp probe to a power leg to verify that the name plate amps are not exceeded while adjusting the blast gate for 30" (7.5 kPa) or 35" (8.7 kPa).

4. Place a jumper on the circuit for the HI Vacuum switch at the junction box so that the GECM Control Panel (if supplied) will not turn the system off during the test.
5. Adjust the blast gate to half way, then turn on the blower.
6. Adjust the blast gate at open flow so that the amp reading is just one (1) value under the nameplate amps specified on the blower, then lock the blast gate in place. Proceed with one of the following options:

### Option 1 - Verifying the current setting of an existing HI Vacuum switch

1. With the blower running, gradually cover the 6" inlet pipe with a hard flat object (not your hand) and monitor the increase in vacuum on the Static Pressure gauge. Keep an eye on the amp reading while doing so.
2. When the ohm meter shows "open" the inches shown on the gauge will be your current setting. If the ohm meter does not show an "open" after reaching the correct inch setting or upon reaching the name plate high amps, then the switch is either set too high or the switch is stuck (a stuck switch needs to be replaced.)
3. Adjust the switch by turning the Set Range screw on top CCW for less inches, CW for more inches.



Some LO-PRO III systems may not reach the maximum inch setting specified for the HP of the blower. If so, then set the switch for the highest setting you can get minus 2" (.5 kPa). For example, if the maximum reached is 27" (6.7 kPa), then set the HI Vacuum switch to open at 25" (6.2 kPa).

4. The switch will be set when the circuit "opens" at the correct inch setting **(without over amping the blower.)**
5. Turn the blower off and restore all electrical connections.

6. If you have a GECM Control Panel, turn the unit back on and cover the inlet pipe to verify that the GECM will turn off the system with the HI Vacuum setting (this will activate after 5 seconds.)
7. Re-connect the inlet pipe and restore the system for operation.

### Option 2 - Adjusting the setting for a new HI Vacuum switch

1. Turn the set screw all the way CCW. The switch will show “closed” on the meter.
2. With the blower running, gradually cover the 6” inlet pipe with a hard flat object (not your hand) until the Static Pressure gauge reaches the desired inches you want to set it at **(do not let the amps exceed the blower specifications)**. With the switch all the way CCW, the meter should already show an “open” circuit.
3. Leave the cover in place on the inlet pipe. Using a flathead screwdriver, turn the set screw CW until the switch “closes”. This will “ball park” the adjustment. Turn the set screw back a few turns and continue to “fine-tune” the switch by removing and **slowly covering** the inlet pipe to verify the current setting. Repeat and adjust the set screw as necessary.
4. The switch will be set when the circuit “opens” at the correct inch setting **(without over amping the blower.)**
5. Turn the blower off and restore all electrical connections.
6. If you have a GECM Control Panel, turn the unit back on and cover the inlet pipe to verify that the GECM will turn off the system with the HI Vacuum setting (this will activate after 5 seconds.)
7. Re-connect the inlet pipe and restore the system for operation.

### Fan/Motor Maintenance

Lubricate fan or motor bearings to the manufacturer’s recommendations. Lubrication recommendations are included with the packet attached to the fan. Should the packet be missing, the following will apply:

| HP<br>Range | Standard Duty<br>8 Hr./Day | Severe Duty<br>24 Hr./Day<br>Dirty-Dusty | Extreme Duty<br>Very Dirty<br>High Ambients |
|-------------|----------------------------|--|---|
| 10-40       | 3 Yrs.                     | 1 Yr.                                    | 4 Mos.                                      |

Recommended motor greases:

Polyrex EM – Exxon Oil Co.

SRI #2 – Chevron Oil Co.

When greasing bearings, it is important not to over-grease. This is especially true if the bearings are not visible. In this case, more bearing failures occur due to over-greasing than under-greasing. It is best to give the bearing just one “shot” of grease (using the previous table) and while the system is warmed up and at a standstill.

### Transfer Pump

If your system includes an optional transfer pump, the following routine maintenance tasks will help to ensure continuous service from the pump. Read the manufacturer supplied User Manual before proceeding.

- Check the flow rate weekly to ensure that the cycling frequency is minimized.
- Inspect hoses and wiring quarterly for cracks, cuts or abrasions.

## Section 5: System Troubleshooting



These procedures are meant to be carried out by personnel qualified to work on electrical circuitry. If in doubt, obtain the services of a qualified electrician.

### Getting Help

If the troubleshooting procedures in this section indicate a component failure, document the problem (as outlined below), then contact Geotech Sales for technical support.

Read the entire manual and become thoroughly familiar with all system components, system operation, and troubleshooting procedures. Prepare a written list of all problems encountered while operating the equipment.

Geotech service personnel are trained on all aspects of the LO-PRO III equipment line and are dedicated to helping you maximize the efficiency and cost effectiveness of your LO-PRO III system. Contact Geotech Sales for technical support of Geotech products.

### Service Location

Geotech Service personnel are trained on all aspects of the LO-PRO equipment line and are dedicated to helping you maximize the efficiency and cost effectiveness of your LO-PRO system. For technical support of Geotech products contact us at the address listed below:

Geotech Environmental Equipment  
2650 East 40th Avenue  
Denver, CO 80205  
Toll Free Phone: 800-833-7958  
Commercial Phone: 303-320-4764  
Fax: 303-320-7242

### Troubleshooting Procedures

The troubleshooting procedures outlined in this section assume that your LO-PRO III is controlled by an optional GECM panel and is equipped with the optional sump probe, vacuum (pressure) switches and water flow gauge. Troubleshooting procedures for LO-PRO III systems without these optional controls are appended at the end of this section.



If the LO-PRO III is operated by a GECM Control Panel, then carefully read the troubleshooting section of the GECM User Manual before proceeding. Many of the display responses on the GECM front panel can easily be used to identify and isolate common problems.

The following troubleshooting guide contains potential problems with possible causes and recommended solutions. Before initiating troubleshooting, become familiar with proper installation and startup procedures as explained in Sections 2 and 3 of this manual.



**Problem:** Blower not running

**1<sup>st</sup> Cause:** Loss of power to the blower.

1. Check for status on GECM Control Panel. If blank, check fuses and wiring connections.
2. Check for tripped motor starter due to high amps.
3. Check for thermal overload on blower motor.

**Solution:**

1. Have qualified electrician inspect the electrical system. Verify amp settings on motor starter is correctly set for the blower motor specs.
2. If there is power to the system and the GECM Control Panel is not-functional, contact Geotech Sales for technical support.
3. Verify that blast gate has not opened all the way causing high amps.

**2<sup>nd</sup> Cause:** The HI Vacuum switch has shut down the blower for one of the following reasons:

1. Obstruction at the air intake portal.
2. Water build-up (entrainment) within the aeration trays.
3. Foaming in the trays or fouling of the bubble plates.
4. HI or LO Vacuum switch out of adjustment (read section on vacuum switches within Section 1).
5. Static sensor tubing line has been cut causing a LO Vacuum fault.

**Solution:**

1. Check for water discharge at the blower effluent. If water is found, skip to Step 2. If water is not found, check the HI Vacuum switch as follows:
  - a) Disconnect the 6" PVC blower influent pipe at the flexible coupling on the lid.'
  - b) Turn the blower control switch to OFF, press RESET, then turn the switch back to AUTO to restart the blower. With the blower running, gradually cover the 6" inlet pipe with a hard flat object (not your hand) and monitor the increase in vacuum on the Static Pressure gauge. Systems with a 10 HP blower should shut down at approximately 30" (7.5 kPa) water column (WC) or less while 15 HP blowers should shut down at approximately 35" (8.7 kPa) WC. If the blower fails to run or shuts off prematurely, refer to Section 4 and verify the adjustment of the HI Vacuum switch. If adjustment is not possible, the switch may be defective. Call Geotech Sales at 800-833-7958 or (303) 320-4764 for assistance.
2. If water is found in the blower piping, proceed as follows:
  - a) Confirm that the water flow rate is below 60 GPM (227 LPM). If the flow rate conforms to specification, check for a stuck float in the optional water flow gauge.
  - b) If the gauge is functioning properly and the flow rate is correctly set, remove the lid from the top of the tray stack and confirm that the water distribution nozzle is directed into the water catch basin.
  - c) If the nozzle is properly positioned, disassemble the tray stack and check for fouling of the bubble plates.
3. If the plates are fouled, clean according to the instructions outlined in Section 4 of this manual.

If the plates are not fouled, the water chemistry at your site may be causing foaming in the LO-PRO III. Call Geotech at 800-833-7958 or (303)320-4764 for assistance.



If the blower has taken on water, the Pitot tube and static tip must be cleaned before the system can be restarted. Remove the Pitot tube and static tip from the plumbing and use compressed air to blow any water from the tubes and air lines. Drain any liquid from the lines and vacuum switches.



Never blow compressed air directly into the gauges or vacuum switches as this may damage them.

**Problem:** Blower not running (system vacuum indicator showing).

**Cause:** The LO Vacuum switch has shut down the blower for one of the following reasons:

1. Incorrect motor rotation.
2. Obstruction at the blower effluent.
3. Severed FEP tubing or disconnected tubing at Static Sensor.

**Solution:**

1. Change the electrical leads on the motor to correct rotation.
2. Clear obstructions from discharge line.
3. Inspect FEP tubing for cuts or kinks.

**Problem:** Blower not running (thermal overload).

**Cause:** Shutdown caused by a blower thermal overload.

Thermal overloads are usually caused by exceeding the full load amps setting on the adjustable thermal overload circuit. Proceed as follows:



Shut down all 3-phase power before opening any enclosure. Follow proper lockout/tag out procedures.

**Solution:**

1. Confirm that the amp draw has not been exceeded. Refer to the blower motor nameplate for proper power supply requirements and adjust setting on the thermal overload circuit inside the motor starter enclosure.
2. Check for high ambient heat levels.
3. Check for minimum air flow requirement stamped on blower.



To restart the blower after thermal overload: Allow the motor to cool. Turn the blower control switch on the GECM Control Panel to OFF, press the REST button, then turn the switch back to AUTO.

Overheating can also be caused by an old or worn motor or insufficient cool air flow over the exterior of the motor.

**Problem:** Low removal efficiency.

**Cause:** Reduced contaminant removal efficiency can be caused by a number of factors, some of which are listed as follows:

1. Verify sizing program vs. actual influent contaminant levels.
2. Water flow rates are improperly adjusted.
3. Bubble plates fouled.
4. Tower out of plumb.
5. Low water temperature.
6. Foaming in trays.
7. Free or suspended product in influent water.
8. Clogged mist eliminator.

**Solution:**

1. Confirm water flow rate is below 60 GPM (227 LPM).
2. Confirm that the tray tower is plumb.
3. Clean mist eliminator using procedures outlined in Section 4.
4. Check for fouling of the bubble plates. Clean per procedure in Section 4.
5. Confirm that water temperatures have not deviated markedly from design parameters.
6. Check for water entrainment caused by foaming. If foaming is suspected, call Geotech for assistance.
7. At sites where contaminant is diesel or other heavy oil, check for presence of sheen in the LO-PRO III sump. If sheen is present, call Geotech for assistance.

**Problem:** Feed pump will not run.

**Cause:** The feed pump is controlled both by its own control circuitry and by input from the LO-PRO III sump probe.

The feed pump will not run unless:

1. Sufficient water is present in recovery well.
2. The LO-PRO III blower is running.
3. Power is present at feed pump control panel.

**Solution:** If these three prerequisites are met and the pump still will not run, proceed as follows:

1. Check the water level in the LO-PRO III sump. If the water level is high, determine why the sump is not draining. Look for a faulty transfer pump, a clogged sump discharge fitting or a fouled sump probe (HI-LO float stuck down). If the water level is not high, check for a fouled sump probe (HI-OVERRIDE float stuck up).
2. Check for a fouled feed pump probe or an electrical fault inside the feed pump control panel. Refer to the troubleshooting procedures provided with the feed pump.

**Problem:** Effluent pump will not run.

**Cause:** The effluent transfer pump is controlled by either a GECM Control Panel, its own control circuitry and by input from the LO-PRO III sump probe.

The effluent pump will not run unless:

1. Sufficient water is present in the sump.
2. Power is present at the effluent pump control panel.
3. Sump probe floats are not stuck.

**Solution:** If these prerequisites are met and the pump still will not run, check for a fouled sump probe or have a qualified electrician inspect the pump wiring and motor starter.

**Problem:** CFM Gauge Not Reading or Pegged Out.

**Cause:**

1. Tubing has been swapped or is cut or kinked.
2. Valve handle(s) on Pitot tube are closed.
3. Pitot tube has been turned in pipe.

**Solution:**

1. Replace bad tubing.
2. If gauge needle is all the way to the left or right, swap the tubing at the Pitot tube.
3. Ensure both valve levers on the Pitot tube are set to open.
4. Sensor holes on Pitot tube need to be in-line with the effluent air flow. Adjust Pitot tube as needed.

## Additional Troubleshooting Procedures

The following procedures can be used to troubleshoot LO-PRO III systems that are not equipped with optional controls.



Exercise extreme caution when working with blowers and motor starters. Always follow all site lockout/tag out procedures.

**Problem:** Blower Not Running

**Cause:**

1. Tripped circuit breaker at service.
2. Blower shut down by thermal overload.

**Solution:**

1. Reset breaker and determine reason for excessive current draw (see below).
2. Determine cause of thermal overload by proceeding as follows:

Thermal overloads can result from bubble plate fouling or foaming in the trays. Fouling or foaming causes the blower to exceed its vacuum limits (30"/7.5 kPa to 35"/8.7 kPa of water) and eventually results in overheating and thermal overload shutdown. Thermal overloads can also be caused by high ambient temperatures around the blower.

Although most LO-PRO III blowers are not equipped with thermal overloads, heavy vacuum demands caused by bubble plate fouling or foaming will cause these blowers to heat up and draw excessive current. This will eventually cause the circuit breaker at the service or motor starter to blow.

Proceed as follows to eliminate the cause of the blower shutdown:

1. Disassemble the tray stack and check bubble plates for fouling. If the plates are fouled, clean as instructed in Section 4.
2. If the plates are not fouled, check for water buildup (entrainment) caused by foaming. To do this, turn off the influent water supply and remove the bottom of the effluent 6" pipe from the back of the blower. If water is found, chemicals at your site are causing foaming inside the LO-PRO III. Call Geotech for assistance.

## Section 6: System Specifications

This page lists all the standard components and optional accessories included with your LO-PRO III Air Stripper. Geotech part numbers for the optional equipment listed can be found in Section 8.

Blower Model: \_\_\_\_\_

Blower horse power: 10 HP \_\_\_\_\_, 15 HP \_\_\_\_\_

GECM Control Panel (optional)\* \_\_\_\_\_ (see specification sheet provided with GECM)

\*When used with the GECM Control Panel, the LO-PRO III must be equipped with HI and LO Vacuum switches and a sump probe.

### Optional Extras

\_\_\_\_\_ HI Vacuum Switch

\_\_\_\_\_ LO Vacuum Switch

\_\_\_\_\_ Sump Probe

\_\_\_\_\_ Transfer Pump

\_\_\_\_\_ CFM Gauge

\_\_\_\_\_ Junction Box

\_\_\_\_\_ Flow Meter

### Dimensions

Length: 72" (183 cm)

Width: 60" (152 cm)

Number of trays: \_\_\_\_\_

Height: \_\_\_\_\_ (see Section 2)

### Materials of Construction

Sump, trays and lid:

Linear Low Density Polyethylene

Bubble Plates:

Stainless Steel

Influent and effluent plumbing:

PVC

### Performance

Water Flow Rate:

1-60 GPM (4-227 LPM)

Removal Efficiency:

Up to 99.99% for BTEX

Air Flow Rate:

Blower Efficiency Dependent

### Blower

Type:

Centrifugal blower (TEFC: for use in Class 1, Div. 2 locations)

Flow Rate:

Up to 1100 CFM (31 CMM)

Voltage:

208-230/460

Phase:

3

HP:

10 – 15

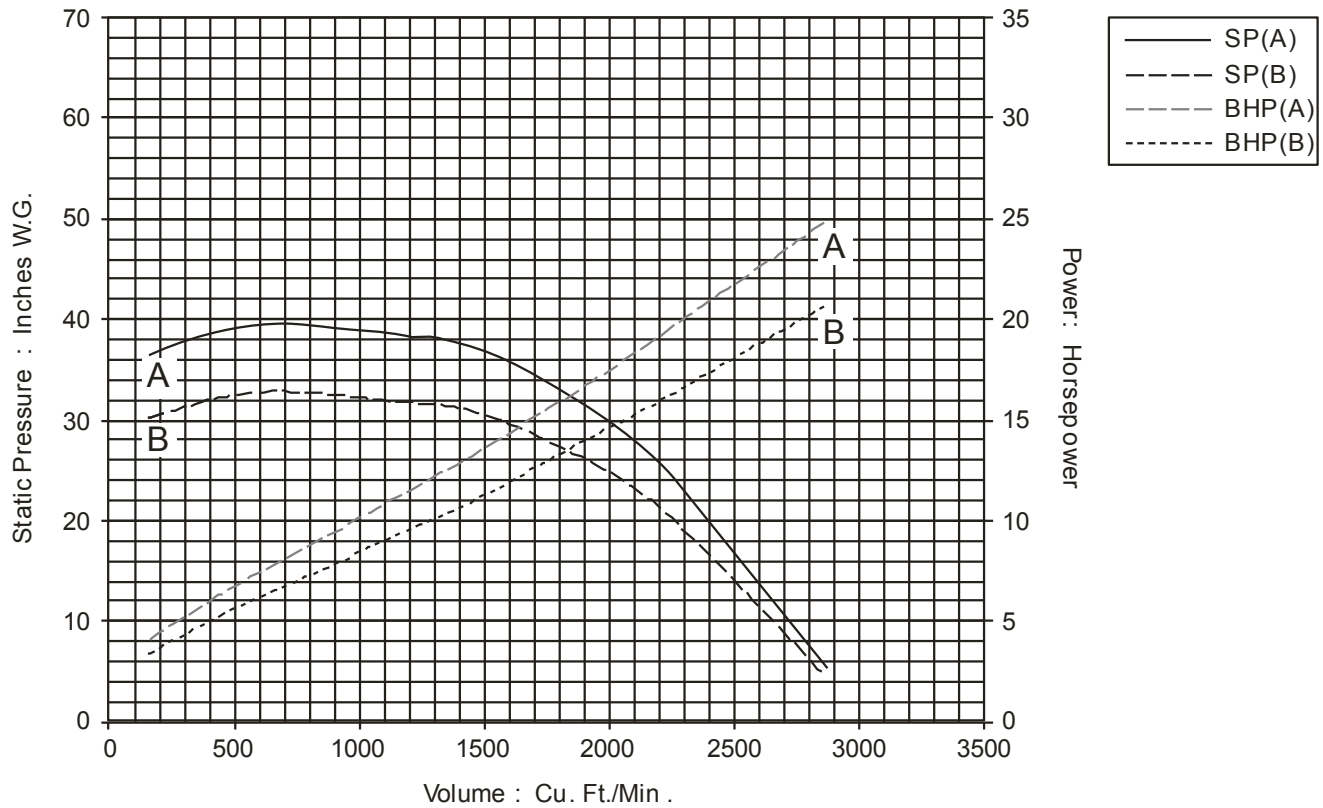
### Environmental

Max Operating Temperature:

122F (50C)

| PERFORMANCE DATA |      |      |     |      |     |         |
|------------------|------|------|-----|------|-----|---------|
| SCFM             | SP   | RPM  | BHP | TEMP | ALT | DENSITY |
| 800              | 38.5 | 3500 |     | 70   | 0   | 0.0750  |

| MOTOR DATA |      |      |                |       |    |      |
|------------|------|------|----------------|-------|----|------|
| HP         | FRAM | RPM  | VOLTS          | PHASE | HZ | ENCL |
| 10         | 215T | 3500 | 208 OR 230/460 | 3     | 60 | TEFC |
| 10         | 215T | 3500 | 208 OR 230/460 | 3     | 60 | XPRF |



A Size = VP-3-06-22.5A RPM = 3500 Density = 0.0750 lb./CF; Width = 100.00% SEA LEVEL

B Size = VP-3-06-22.5A RPM = 3500 Density = 0.0624 lb./CF; Width = 100.00% 5300 FEET

Figure 6-1 - LO-PRO III 10 HP Blower Performance Curve

## LO-PRO III Wiring Diagrams

All LO-PRO III systems using a GECM Control Panel will have a GECM Field Wiring Diagram provided detailing all wire connections to the unit. This diagram can be updated or replaced as needed by Geotech.

Without the use of a GECM Control Panel, the on-site electrician will need to wire the blower motor to an appropriate motor starter and power service. The wiring from the LO-PRO III junction box (containing the wiring from the vacuum switches and sump probe) along with the motor thermals, must be integrated as a system shutdown component to the motor starter circuit in order to terminate power in the event of equipment failure.

Geotech can also build unit specific start boxes for use with the LO-PRO III, transfer pump, and accessories. Contact Geotech for more information on system requirements. Figure 6-1 contains basic wiring for a three phase blower (examples do not include junction box integration).

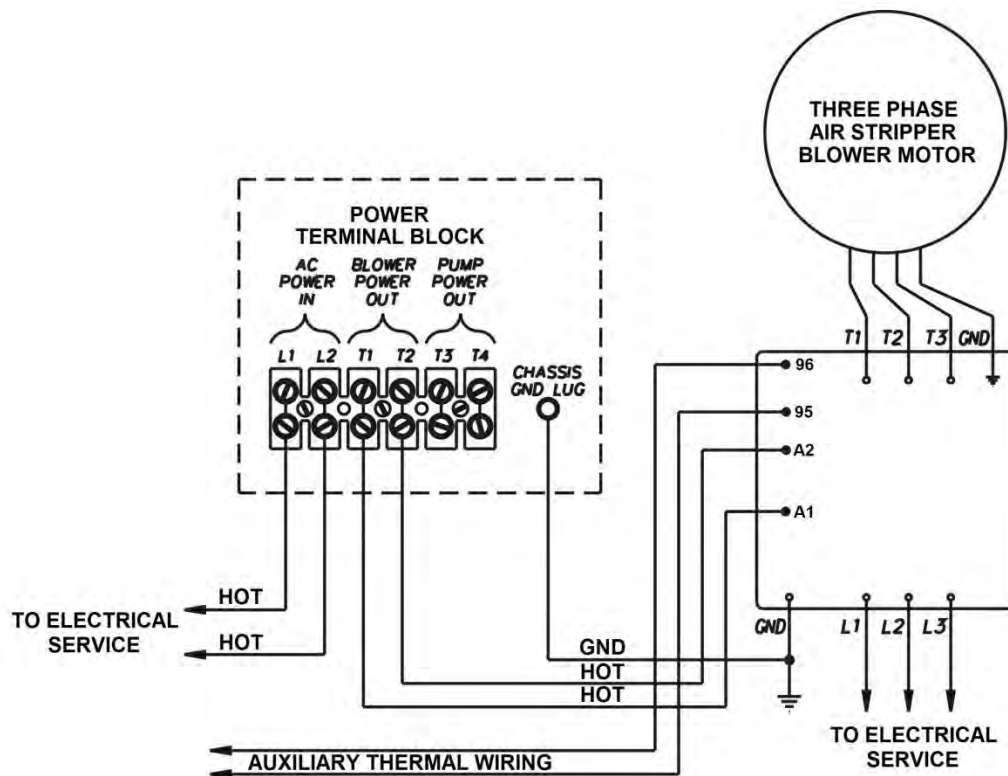


Figure 6-2 – Basic Three Phase Wiring Diagram



## Section 7: System Schematic

### System Configuration

Because the LO-PRO III is designed with the flexibility to cover a wide variety of applications, many different system configurations are possible. The System Specification sheet for your LO-PRO III can be found in Section 6. System dimensions and locations of influent/effluent water and air hookups are provided in Figures 1-2 and 2-1. Figure 7-1 contains the Process & Instrumentation Diagram for a standard LO-PRO III with optional controls.

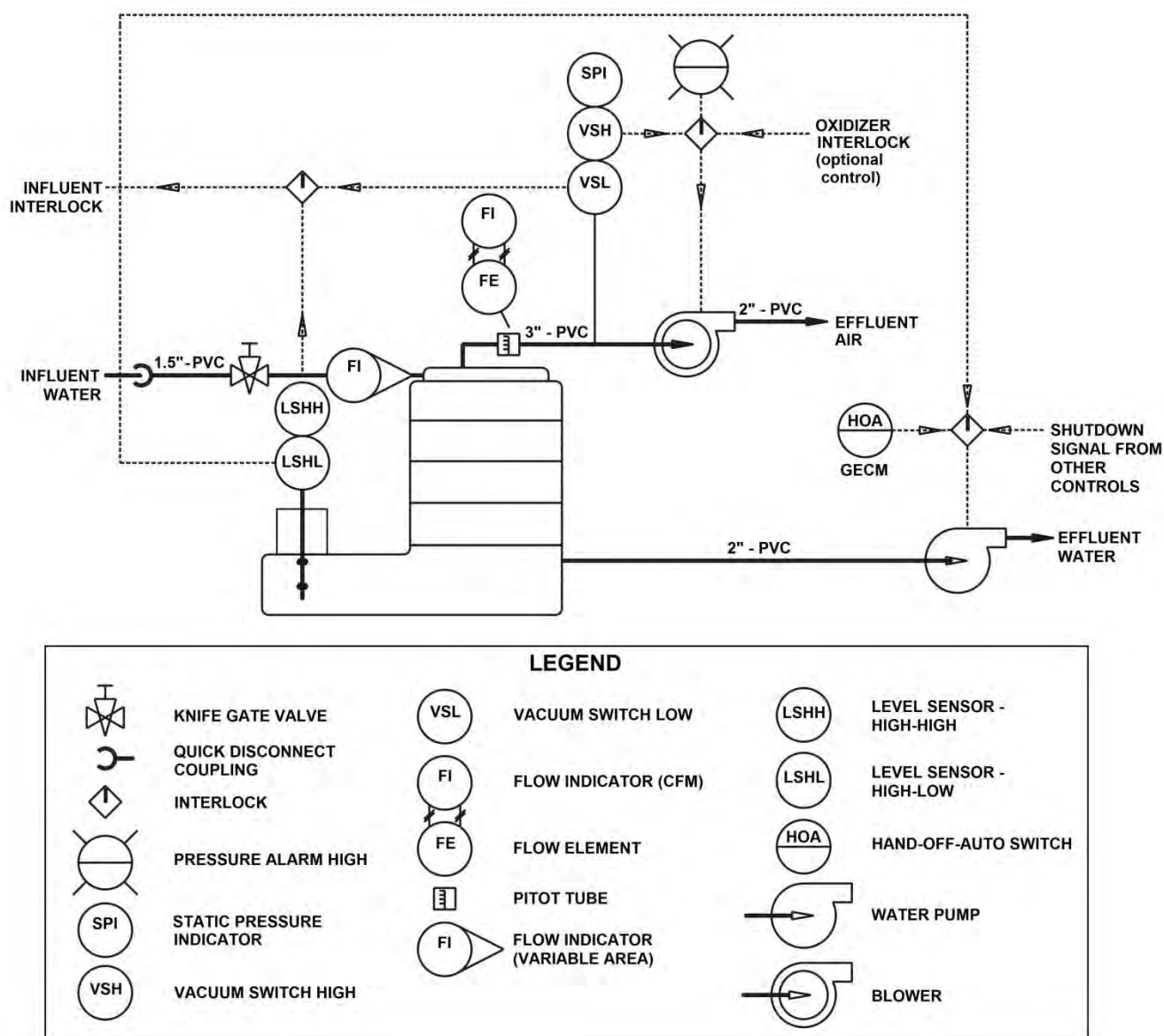


Figure 7-1 - The LO-PRO III Air Stripper P & ID showing optional controls and accessories.

## Section 8: Replacement Parts and Accessories

| Parts Description             | Parts List |
|-------------------------------|------------|
| TANK,SUMP,72"x60"x16"HIGH     | 10263      |
| TRAY,42"x60"x13"HIGH          | 10262      |
| GASKET,LOPRO III TRAY,3 PIECE | PPM019008  |
| BUBBLE PLATE,SS4,38.50x56.25  | 10284      |
| DOWN COMER ASSY,SUMP LOPROIII | 2450012    |
| DOWN COMER ASSY,POLYPRO       | 2450000    |
| PIN,STABLIZER,FOR LOPRO TRAY  | 10376      |
| LID,42"x60"x15"HIGH           | 10261      |
| MIST ELIM,12"x32"x4"THK       | 10872      |
| STRAP,DEMISTER RETENTION      | 10695      |
| ASSY,BASIN,TOP TRAY           | 2450005    |

### Tray Assemblies

|                           |         |
|---------------------------|---------|
| TRAY ASSY,13"HIGH,POLYPRO | 2450003 |
|---------------------------|---------|

### Control Panel and Instrumentation

|  |           |
|--|-----------|
| PANEL,MOUNTING,LOPROIII,GAUGE                                    | 56140002  |
| SWITCH,PRESS,SPDT,1.5-8 PSIG 1950P-8-2F                          | 10745     |
| SWITCH,PRESS,0.5-2.0PSI,EP                                       | PPE080017 |
| SWITCH,PRESS,0.4-1.6"WC  | PPE080006 |
| SWITCH,PRESSURE,DIFF,10-180"WC EXPL PROOF,<br>H3 SER,H3A-1SL,DWY | 16090265  |
| LO PRESS. SHUT DOWN ASSY:  | 2100074   |
| ASSY,SHUT DOWN,HIGH PRESSURE                                     | 2100075   |
| GAUGE,VACUUM,0-50"WATER-0-12KP                                   | PPP082023 |
| SENSOR,STATIC TIP,W/HOSE   | PPP099004 |
| GAUGE,PRES,0-450CFM,0-12M3/MIN                                   | 16090010  |
| GAUGE,FLOW,0-1000 CFM & M3/MIN                                   | 10715     |
| FILTER,AIR,.175"NPT,20CFM  | 10315     |
| SENSOR,FLOW,6",SST,PITOT   | 10631     |
| ASSY,AIR FLOW SENSOR,6"PIPE                                      | 2460002   |

### Air Line

|                                     |           |
|-------------------------------------|-----------|
| TEE,1/8"NPTx1/4"TUBE                | PPP105002 |
| QCK CNCT,NCKL,1/4X1/8MPT,PUSH/ PULL | PPP103001 |
| TUBING,FEP,.170x1/4,FT FEP          | 87050509  |

### Blowers

|  |       |
|--|-------|
| BLOWER,10HP,TEFC,208/230/460/3<br>/60HERTZ 800 CFM @ 32" WATER | 10871 |
|--|-------|

## Transfer Pumps

|                         |       |
|-------------------------|-------|
| PUMP,2HP,15GPM,150'HEAD | 10451 |
|-------------------------|-------|

## Accessories

|   |           |
|---|-----------|
| JB,SITEPRO SGNL   | 2390065   |
| CABLE,28AWG,8 COND,URETH                                | ORS418005 |
| FERRULE WIRE,COPPER,26-22AWG 1 PACK OF 100              | 10032     |
| FLOWMETER,6-60GPM,WATER                                 | 10653     |
| PROBE,DENS,SUMP   | 2450014   |
| ELBOW,PVC80,6",SxS                                      | 10592     |
| PIPE,PVC80,6",GRAY,CLEAN, INDIVIDUALLY WRAPPED,NO PRINT | PPP035033 |
| COUPLING,FLEXIBLE,6"x6"                                 | 10593     |
| UNION,PVC80,2",SXS                                      | PPP053004 |
| PIPE,PVC80,2"   | PPP035001 |
| FRAME,BLOWER TO SUMP,PAINTED                            | 10655     |
| FRAME,BLOWER,VERTICLE,PAINTED                           | 10627     |
| SHROUD,AIR INTAKE,LP3                                   | 10611     |
| MANUAL,LO PRO III                                       | 10609     |
| MANUAL,GECEM  | 16110163  |

Contact your Geotech Sales Representative for more information on GECEM Control Panels and other electrical features, including our variety of Water Table Depression Pumps, supporting the LO-PRO III System.

## Appendix A: Decontamination Procedures

Some common decontamination solutions are listed below along with the contaminants they are effective against.

| <b><u>Solution</u></b> | <b><u>Effective Against</u></b>  |
|------------------------|--|
| Water                  | Short-chain hydrocarbons, inorganic compounds, salts, some organic acids, other polar compounds. |
| Dilute Acids           | Basic (caustic or alkaline) compounds, amines, hydrazines.                                       |
| Dilute Bases           | Acidic compounds, phenols thiols, some nitro- and sulfonic compounds.                            |
| Organic solvents       | Non-polar compounds (such as some organic compounds)   |

The use of organic solvents is not recommended because:

- 1) organic solvents can permeate and/or degrade protective clothing and
- 2) they are generally toxic and may result in unnecessary employee exposure to hazardous chemicals.

When in doubt, use a dish washing liquid detergent. As a decontamination solution, it is readily available, is the safest of all the above, and is usually strong enough if used generously.

The use of steam can also be effective for decontamination. A water-lazer (pressurized water) is exceptionally valuable.

The following substances are noted for their particular efficiency in removing certain contaminants or for decontaminating certain types of equipment.

| <b><u>Solution</u></b>   | <b><u>Effective Against</u></b>  |
|--------------------------|--|
| Penetone                 | PCB Contamination (since penetone may also remove paint, it is a good idea to spot-test before use)            |
| Phosphate free detergent | Contaminated pumps   |
| Ivory liquid             | Oils   |
| Diluted HTH              | Cyanides   |
| Radiac                   | Low level radioactivity  |
| Isopropanol              | Biological agents (should not be used on rubber products since it will break down rubber)                      |
| Hexane                   | Certain types of lab or sampling equipment (use of hexane is discouraged due to its flammability and toxicity) |
| Zep                      | General purpose cleaning   |
| Phosphate free detergent | General purpose cleaning   |

### Decontamination Solutions to Avoid

Some decontamination solutions should be avoided because of their toxicity, flammability, or harmful effects to the environment. Halogenated hydrocarbons, such as carbon tetrachloride, should not be used because of their toxicity, possible incompatibility, and some because of their flammability.

Organic decontamination solutions should not be used on personal protective equipment (PPE) because they may degrade the rubber or other materials comprising the PPE.

Mercurials are sometimes used for sterilization. They should be avoided because of their toxicity.

Chemical leaching, polymerization, and halogen stripping should all be avoided because of possible complications during decontamination.

Sand-blasting, a method of physical removal, should be avoided because the sand used on the contaminated object usually needs to be disposed of as hazardous waste, a very costly proposition. In addition, sand-blasting exposes personnel to silica, a carcinogen.

Freon is known to be particularly effective for the cleansing of PCB's but its effect on the ozone layer is extremely harmful. Its use is discouraged.

Strong acids or bases should not be used when cleaning metals and gaskets or tools or other equipment because of the possibility of corrosion.

### **Disposal of Decontamination Solutions and Waste Water**

All solutions and water used for decontamination must be collected. If lab analysis indicates that the water and/or solutions exceed allowable contamination levels, they must be treated as hazardous waste. Alternatively, the solutions and water may be treated on-site to lower the contamination levels and render them non-hazardous.

Containers such as 55 gallon (208 liter) drums should be available for storage of wastes.

Spent decontamination solutions can be collected by using heavy-duty plastic sheets, visqueen sheets, kiddie pools, or if needed, a larger containment basin. The decontamination of equipment must be performed on the sheets or in the basins. They could be placed on a slight angle so that the spent decontamination solutions drain into a collection basin or drum.

### **Recommended Supplies for Decontamination of Personnel, Clothing and Equipment**

The list below contains recommendations for supplies which would be on hand for the decontamination of personnel, clothing and equipment. Depending on the site activities, not all of these items may be needed. Alternatively, some additional items not listed here may be required.

- Drop cloths of plastic or other suitable material, such as visqueen, for heavily contaminated equipment.
- Disposal collection containers, such as drums or suitably lined trash cans for disposable clothing and heavily contaminated personal protective clothing or equipment to be discarded.

- Lined box with adsorbent for wiping or rinsing off gross contaminants and liquid contaminants.
- Wash tubs of sufficient size to enable workers to place booted foot in and wash off contaminants (without a drain or with a drain connected to a collection tank or appropriate treatment system).
- Rinse tubs of sufficient size to enable workers to place booted foot in and wash off contaminants (without a drain or with a drain connected to a collection tank or appropriate treatment system).
- Wash solutions selected to wash off and reduce the hazards associated with the contaminated wash and rinse solutions.
- Rinse solution (usually water) to remove contaminants and contaminated wash solutions.
- Long-handled, soft-bristled brushes to help wash and rinse off contaminants.
- Lockers and cabinets for storage of decontaminated clothing and equipment.
- Storage containers for contaminated wash and rinse solutions.
- Plastic sheeting, sealed pads with drains, or other appropriate method for containing and collecting contaminated wash and rinse water spilled during decontamination.
- Shower facilities for full body wash or at a minimum, personal wash sinks (with drains connected to a collection tank or appropriate treatment system).
- Soap or wash solution, wash cloths and towels.
- Clean clothing and personal item storage lockers and/or closets.

| DOCUMENT REVISIONS |  |            |
|--------------------|--|------------|
| EDCF#              | DESCRIPTION  | REV/DATE   |
| -                  | Previous Release   | 01/09/2013 |
| Project 1409       | Edited images and spare parts to show new style shroud, edited tubing from poly to FEP, SP | 10/30/2014 |

## **The Warranty**

For a period of one (1) year from date of first sale, product is warranted to be free from defects in materials and workmanship. Geotech agrees to repair or replace, at Geotech's option, the portion proving defective, or at our option to refund the purchase price thereof. Geotech will have no warranty obligation if the product is subjected to abnormal operating conditions, accident, abuse, misuse, unauthorized modification, alteration, repair, or replacement of wear parts. User assumes all other risk, if any, including the risk of injury, loss, or damage, direct or consequential, arising out of the use, misuse, or inability to use this product. User agrees to use, maintain and install product in accordance with recommendations and instructions. User is responsible for transportation charges connected to the repair or replacement of product under this warranty.

## **Equipment Return Policy**

A Return Material Authorization number (RMA #) is required prior to return of any equipment to our facilities, please call our 800 number for appropriate location. An RMA # will be issued upon receipt of your request to return equipment, which should include reasons for the return. Your return shipment to us must have this RMA # clearly marked on the outside of the package. Proof of date of purchase is required for processing of all warranty requests.

This policy applies to both equipment sales and repair orders.

FOR A RETURN MATERIAL AUTHORIZATION,  
PLEASE CALL OUR SERVICE DEPARTMENT AT 1-800-833-7958

Model Number: \_\_\_\_\_

Serial Number: \_\_\_\_\_

Date of Purchase: \_\_\_\_\_

## **Equipment Decontamination**

Prior to return, all equipment must be thoroughly cleaned and decontaminated. Please make note on RMA form, the use of equipment, contaminants equipment was exposed to, and decontamination solutions/methods used.

Geotech reserves the right to refuse any equipment not properly decontaminated. Geotech may also choose to decontaminate equipment for a fee, which will be applied to the repair order invoice.



**Geotech Environmental Equipment, Inc**  
2650 East 40th Avenue Denver, Colorado 80205  
(303) 320-4764 • **(800) 833-7958** • FAX (303) 322-7242  
email: [sales@geotechenv.com](mailto:sales@geotechenv.com) website: [www.geotechenv.com](http://www.geotechenv.com)

# Geotech

---

## Project Information

Project Name: **ATI Acid Sump Project**  
Project Number: **RC121115-01**  
User Name: **Andrew Davidson- GSI Water Solutions**  
Date printed: **12/11/2015**

---

## Selection Criteria

Classification: **Unclassified**  
Line Voltage: **208-230 volts, 3 Ph, 60Hz**  
LoPro Type: **LoPro3**  
Liquid flow rate: **30 gpm**  
Min. Liquid temperature: **50 F**  
Selection Method: **Manual**

---

## Results

Blower type: **10HP American Fan**  
Number of trays: **5**  
Starting air flow: **1100.0 CFM**  
Clean trays at: **720.0 CFM**  
Starting air/water ratio: **274.2**

| <u>Contaminant</u>        | <u>Design Influent (ppb)</u> | <u>Effluent Target Conc (ppb)</u> | <u>Effluent After Single Pass (ppb)</u> | <u>Potential Excess ppb.</u> | <u>% Stripping Efficiency</u> |
|---------------------------|------------------------------|-----------------------------------|---|------------------------------|-------------------------------|
| 112 TRICHLOROETHANE       | 280000.0                     | 200.0                             | 486.0                                   | 286.0                        | 99.83                         |
| 11 DICHLOROETHANE         | 36000.0                      | 50.0                              | 2.2                                     | 0.0                          | 99.99                         |
| 12 DICHLOROETHANE         | 1000.0                       | 5.0                               | 1.6                                     | 0.0                          | 99.84                         |
| CHLOROETHANE              | 13000.0                      | 25.0                              | 0.1                                     | 0.0                          | 100.00                        |
| TRICHLOROETHYLENE         | 2000.0                       | 5.0                               | 0.0                                     | 0.0                          | 100.00                        |
| CIS 12 DICHLOROETHYLENE   | 1000.0                       | 70.0                              | 0.6                                     | 0.0                          | 99.94                         |
| TRANS 12 DICHLOROETHYLENE | 1000.0                       | 100.0                             | 0.1                                     | 0.0                          | 99.99                         |
| 11 DICHLOROETHYLENE       | 20000.0                      | 7.0                               | 0.1                                     | 0.0                          | 100.00                        |
| VINYL CHLORIDE            | 1000.0                       | 2.0                               | 0.0                                     | 0.0                          | 100.00                        |
| TETRACHLOROETHYLENE       | 1000.0                       | 5.0                               | 0.0                                     | 0.0                          | 100.00                        |

\*\*\* Notice \*\*\*

This program assumes that the user has entered in the correct data. The selections made are to be used as a general guide only. The user is responsible for ensuring that the equipment is installed properly and in good operating condition.

Please contact Geotech Inc. @ 1-800-833-7958 for further assistance if necessary.  
Copyright 1999 Geotech Inc.

**PRODUCT DATA SHEET**

April, 2008

**EZ CLEAN FIXED AXLE  
OPEN ACCESS TANK**

(b) (4)

To the best of our knowledge the technical data contained herein are true and accurate at the date of issuance and are subject to change without prior notice. No guarantee of accuracy is given or implied because variations can and do exist. NO WARRANTY OR GUARANTEE OF ANY KIND IS MADE BY BAKERCORP, EITHER EXPRESSED OR IMPLIED.

3020 OLD RANCH PARKWAY • SUITE 220 • SEAL BEACH, CA • 562-430-6262

(b) (4)

(b) (4)

|  |   |   |
|--|---|---|
| The information contained herein is proprietary to BakerCorp and shall not be reproduced or disclosed in whole or in part, or used for any design or manufacture except when user obtains direct written authorization from BakerCorp. | — | 3020 OLD RANCH PARKWAY<br>SEAL BEACH, CA 90740-2751 |
|--|---|---|

(b) (4)

(b) (4)



***PRODUCT DATA SHEET****January, 2007***6500 GALLON POLY TANK  
(Original Style and Total Drain)**

(b) (4)



To the best of our knowledge the technical data contained herein are true and accurate at the date of issuance and are subject to change without prior notice. No guarantee of accuracy is given or implied because variations can and do exist. NO WARRANTY OR GUARANTEE OF ANY KIND IS MADE BY BAKERCORP, EITHER EXPRESSED OR IMPLIED.

(b) (4)

(b) (4)

The information contained herein is proprietary to BakerCorp and shall not be reproduced or disclosed in whole or in part, or used for any design or manufacture except when user obtains direct written authorization from BakerCorp.



**BAKER**CORP™

3020 OLD RANCH PARKWAY  
SEAL BEACH, CA 90740-2751

(b) (4)

## **Appendix D**

ATI Emergency Action Plan, SI C-02

---





*ATI Millersburg Operations and ATI Albany Operations - 34<sup>th</sup> Ave*


Safety Instruction #: SI C-02  
Emergency Action Plan (EAP)

Revision: 11

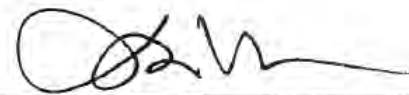
Date: July 3, 2014

Initiated By:  4/17/14  
Shawna Howard, Safety Engineer Date

Reviewed By:  6/16/14  
Kevin Moran, USW Millersburg Ops Safety Coordinator Date

Reviewed By:  6/19/14  
Josh Hall, USW Albany Ops – 34<sup>th</sup> Ave Safety Coordinator Date

Reviewed By:  6/16/14  
Ryan Bodily, SA&C Safety & Health Manager Date

Approved By:  7/2/14  
Lee Weber, VP of Operations Date

\* Denotes change from previous revision.



## I. **Scope**

This Emergency Action Plan (EAP) covers both the ATI Albany Operations – 34<sup>th</sup> Ave and ATI Millersburg Operations facilities. This plan defines actions that will be taken by all personnel (employees, contractors, visitors, etc.) before and during an emergency such as a fire, explosion, hazardous material release, security incident or natural disaster in an effort to minimize hazards to human health, the environment, property and equipment.

## II. **Purpose**

This plan, when combined with the Emergency Response Plan (ERP), SI C-13, outlines how ATI Albany Operations – 34<sup>th</sup> Ave and ATI Millersburg Operations comply with the Environmental Protection Agency (EPA) regulations found in 40 CFR Part 265 and Occupational Safety and Health Administration (OSHA) regulations found in 29 CFR 1910.38, 1910.165, and 1910.120(q).

This EAP establishes the procedure for personnel to identify and report potential emergency situations and potential accidents that can have an impact on people, the environment, property and equipment. The ERP addresses how employees shall respond to emergency situations and accidents to prevent or mitigate associated adverse health, safety, environmental or business impacts.

Actions required by those who will respond to a potential or actual release of a hazardous material with the intention of containing, controlling or otherwise mitigating the release are provided in the ERP SI C-13.

## III. **Responsibilities**

- a. All Employees, Contractors, Vendors, Visitors, etc.: Be aware of your surroundings and job responsibilities. Report actual or potential emergencies such as chemical releases, fires, security incidents or other emergency situations as explained in Section IV below. Be familiar with the alarm, assembly and evacuation procedures outlined in this plan.
- b. Department Managers: Ensure all Department employees are trained on the elements of this EAP and Department specific assembly areas, procedures and evacuation routes. Ensure all employees who may use an emergency escape respirator are trained following SI C-03. This training is typically done as part of a:
  - i. Monthly Safety Meeting and/or;
  - ii. Safe Job Introduction for New or Transferred Employees (SI S-06).
- c. Purchasing Plant Engineering: Ensure that all vendors, suppliers and contractors who have access to the plant receive training on this Emergency Action Plan.
- d. Visitor Escorts: Ensure visitor access is in compliance with Plant Entry Policies and escort visitor at all times so they act accordingly during an emergency.
- e. Supervisors or Appointed Designee: Take temporary control during an emergency in their department/area using the Supervisor Emergency Action Checklist (Appendix C) and provide assistance to the SERO upon arrival.
- f. Senior Emergency Response Official (SERO): Act in the role of an Emergency Coordinator, respond to emergencies and establish Command in accordance with the Incident Command System (ICS). Arrange for, and coordinate response activities with internal and external public and private agencies. Direct Spill Team activities for



hazardous material events. Plan and organize quarterly emergency response drills to practice this plan. Facilitate a critique after incidents and drills to provide feedback and revise procedures and plans as needed. Names, addresses, and telephone numbers (office and home) for each SERO are published in the ERP, SI C-13.

- g. Maintenance Department: In the event of a fire, some areas have local audible and visual alarms. At the ATI Millersburg Operations plant site, an alarm will sound in the Maintenance stockroom which notifies a Maintenance Supervisor to respond to the fire pumps and ensure they are operational.
- h. Safety Office: Arrange for the inspection and maintenance of Spill Team vans, the Spill Response Trailer and all emergency response center supplies to include:
  - Safety vest
  - Emergency radio
  - Extra AA batteries for the emergency radio
  - Check the operation of the emergency radio monthly and change batteries every 6 months.
  - Ensure this EAP is reviewed yearly and revised as needed.
- i. Environmental Department: Assist in emergency situations, accidents and remediation activities as needed to prevent or mitigate associated adverse environmental aspects. Environmental Department will maintain a spill pager team who will contact OERS, EPA, DEQ and/or the NRC as needed. This procedure is defined in Work Instruction WI-EMC-AII-1.

#### **IV. Reporting Emergencies**

When an emergency occurs, call Security immediately at Ext. 6334 (ATI Millersburg Operations) or Ext. 7911 (ATI Albany Operations – 34<sup>th</sup> Ave) and state the nature of the emergency. Also notify the Supervisor of the affected area.

Security follows emergency procedures including:

- i. Contacting outside emergency responders (911) for fire or medical emergency;
- ii. Contacting the on-duty SERO via telephone for plant emergencies (chemical upset, fires, natural disasters, etc.);
- iii. Contacting the on-duty in-plant medical responders for medical emergency (see SI M-07);
- iv. Following HR Policy #303 for bomb threats;
- v. Activating plant alarms:
  - 1. 1-1 “Take Cover” alarm for all security and domestic threats involving intruders or terrorist threats;
  - 2. 3-3 “Assemble” alarm for all chemical upsets, fires that involve more than one department or building, and earthquakes;
  - 3. Long Continuous Blast for Plant Evacuations after an “Assemble” alarm and completed headcount;
  - 4. 5-5 “All Clear” return to work;



*Note: The SERO initiates evacuation orders and provides other specific information to the Designated Coordinators for employee action via the Radio Talker and Emergency Radios.*

*At ATI Albany Operations – 34<sup>th</sup> Ave switch your personal hand held radio to Channel 10. This is a receive only channel used during emergency situations.*

## **V. Emergency Escape Routes**

Escape route maps are posted throughout the facilities near telephones, and/or on employee bulletin boards, and/or near time clocks.

Escape route maps identify the nearest exits out of work areas, the designated assembly areas for the department and the nearest plant evacuation route.

All employees are responsible for the following:

- i. Knowing the location(s) of the nearest exit(s) and evacuation route(s) out of their work area(s);
- ii. Knowing the location(s) of the primary and alternate assembly area(s) designated for their work area(s).

## **VI. Emergency Alarms/Warnings**

Notification to employees of the existence of an emergency and the need to assemble or evacuate occurs by one or more of the following mechanisms:

- i. The Plant Wide Emergency Alarm System;
- ii. A telephone activated building public address system;
- iii. Hand-held radios;
- iv. Sprinkler flow audible and visual (strobe) alarms;
- v. Smoke detector alarms;
- vi. Person to person contact if other methods are inadequate

See Section IV: Plant-Wide Emergency Alarm System explains the Plant-Wide Emergency Alarm signals.

All employees are responsible for knowing the sounds and/or lights of the alarm system(s) in their work area(s).

## **VII. Take Cover Procedure**

Remain indoors or take cover in the nearest building. Close, lock and stay away from windows and doors if possible. Do not proceed to assembly area. Use emergency radios only if accessible without leaving the building. Radio Talker updates may not be made for this situation. Report any suspicious activity to Security at Ext. 6334 (ATI Millersburg Operations) or Ext. 7911 (ATI Albany Operations – 34<sup>th</sup> Ave).

## **\* VIII. Assembly and Evacuation Procedures**

Proceed to the designated department assembly area through the nearest exit. Select an assembly area upwind from any exposure. Go to the alternate assembly area if the primary assembly area is impacted. If not in your normal work area, go to the nearest assembly area and check in with the Designated Coordinator. If you are in your assigned assembly area check in with Designated Coordinator.



If possible, Supervisors are the last to leave the work area(s) and assure all personnel in their work area(s) have left prior to exiting the work area. Use Appendix D as an action check list. Do not park in the assembly area. Do not leave the designated assembly area until instructed to do so by the Designated Coordinator, "All Clear" signal or supervisor. If a plant evacuation is called, proceed on foot using the nearest evacuation route. Personal or company vehicles are not to be used for evacuation. Ensure all personnel at initial assembly area are accounted for at off-site assembly area after evacuation. Communicate with the Radio Talker after an evacuation for further instructions.

**IX. Procedures Followed by Employees Who Remain to Operate Critical Plant Operations Before Evacuation or Assembly**

Follow procedures for shutdown of critical equipment or processes. Only qualified operators, trained in the specific shut down procedures of critical equipment or processes, remain behind. Employees who shut down critical equipment or processes will only do so if the shutdown can be accomplished safely. Leave the area immediately if the critical equipment or process is involved in the emergency or is in the hazard area.

**\* X. Procedures to Account for All Employees**

Each work area supervisor shall identify all individuals present in the assembly area for their work area as well as those employees involved in the shutdown of critical operations or processes and notify the Designated Coordinator of those accounted for. Designated Coordinators notify the Radio Talker of any missing or extra personnel via Emergency Radios when asked using appendix B as a check list and Appendix D as a communication guide.

**XI. Natural Gas Interruptions**

The main feed line distribution station is located at the ATI Albany Operations - 34th Ave facility 200 yards South East of Building #4, and is protected with locked security fencing. SERO's are the pipeline safety officers and oversee all emergency actions associated with the distribution station to include shutting down the main line.

The ATI Millersburg Operations has several isolation points to stop the flow of gas in an emergency. At both plants there are seismic shut-off valves located in various points in natural gas piping to stop the flow of gas in the event of an earthquake.

**XII. Flood Plan**

The ATI Albany Operations – 34<sup>th</sup> Ave and the majority of the ATI Millersburg Operations are located above the 100 year flood plain elevation. Those areas of ATI Millersburg Operations below this elevation, primarily the wastewater treatment facility, follow WI-EMO-21 in the event of a flood.

**\* XIII. Earthquake Plan**

In the event of an earthquake, the above procedures will be followed for assembly and evacuation of the plant, if necessary. Hazardous material releases caused by such an event are handled in accordance with SI C-13. Natural gas leaks will be handled by isolating the flow of gas and fires will be addressed by the Albany Fire Department.

Following any significant earthquake, all buildings must undergo a thorough engineering review before they can be reoccupied. Also, all processes, piping, valves, tanks, etc. must be reviewed to ensure they are in proper operating condition before equipment and/or processes are restarted.



Note: A significant earthquake is defined as one with a minimum of a Mercalli Intensity of VII, which corresponds to an equivalent Richter magnitude of 6.0. These events have slight to moderate damage in well-built, ordinary structures. This will result in considerable damage to poorly built structures and some walls may fall. See Appendix E for USGS reference chart.

**\* XIV. Inclement Weather**

During times of extreme weather or other hazardous conditions, directors will meet to discuss the forecast and/or current plant conditions. Once a risk reduction plan is formulated based on the situation, the V.P. of Operations will review and approve the plan prior to implementation.

**If the event has been forecasted, the directors will meet ahead of time to confirm the following:**

- Deicer is stocked and available in all departments throughout the plant. The Manager of Purchasing will ensure that additional inventory of deicer is maintained in the Receiving Warehouse starting November 1<sup>st</sup> of each year.
- Ice cleats are stocked in each deicer storage box.
- Contractors supporting the event have been informed of the pending situation by the Manager of Roads and Grounds, and have staged rock and equipment on the plant site as needed. Additional equipment anticipated has been rented. Priorities for road maintenance are communicated via plant drawing 21184 (ATI Millersburg Operations) and 109645 (ATI Albany Operations – 34<sup>th</sup> Ave).
- Employees have been informed of pending event (e-mail, reader boards) and requested to check the plant pre-recorded message at (541)926-4211, for updates and the current operating status of the plant.

**During the event, the directors will meet to evaluate the current conditions and consider the following while developing a risk reduction plan:**

- Can employees safely travel on outdoor walkways?
  - Potential Actions: Stay inside if possible; wear ice cleats if critical work outside is required; contract roads and walkways to be cleared; apply deicer
- Can IME be operated outside in a safe manner?
  - Potential Actions: Limit IME use outside to only critical tasks; contract roads and walkways to be cleared, apply deicer
- Did enough staff report to work to safely continue operating production equipment?
  - Potential Actions: Shutdown non-critical operations
- Do conditions dictate a full or partial day closure?
  - Potential Actions: Do not count absence as unapproved; allow LWOP or vacation; follow company HR Policy 415 detailing extreme weather conditions and absence information.
- What department or specific equipment needs to continue to run to minimize potential damage?
  - Potential Action: Staff critical departments or equipment areas





- What notifications need to be made to employees?
  - Potential Action: Update plant recording; follow company HR Policy 415 detailing extreme weather conditions and absence information

#### **XV. Power Outage Plan**

In the event of a plant wide power outage, it is up to each department to determine if employee assembly is necessary to ensure safety. Each employee should remain in their area unless directed otherwise. Landline and cell phone communication may be interrupted and Security will need to be contacted in person or by 2-way radio.

#### **XVI. Rescue & Medical Duties for Responding Employees**

Do not attempt any rescue unless properly trained, equipped and not placed in danger. Those who are trained medical responders (available 24x7) render first aid/medical care within their capabilities and training. The on-duty medical responder determines transportation of the ill and injured. The Albany Fire Department is used for critical injuries and for advanced life support and transportation during hazardous material emergency responses.

#### **XVII. Review Process**

The Safety Office monitors, reviews and updates this EAP when any of the following occur:

1. There is a revision or introduction of new applicable regulations
2. The plan fails in an exercise or real emergency
3. Changes to the configuration of the emergency response area
4. Introduction of new hazards into the emergency response area



\*

## **Appendix A: Designated Coordinators and Assembly Areas**

Designated Coordinators are responsible for the following:

ATI Millersburg Operations:

- Knowing the Emergency Evacuation Routes and Assembly Areas (AA);
- Designating an alternate coordinator during absences from the facility, including nights and weekends;
- Completing the Assembly and Headcount Checklist in Appendix B. The alternate coordinator or individual assigned by the supervisor completes the form in primary Designated Coordinator's absence;
- Maintaining the Department or Area Specific Emergency Action Plan binder which includes;
  - Designated Coordinators and Assembly Area List;
  - Procedure designating alternate coordinator(s)
  - For areas that are not manned 24/7, specify an alternate assembly area for off shift assemblies and communicate to the effected employees;
  - Posting of Evacuation Route Maps.

ATI Albany Operations – 34<sup>th</sup> Ave:

- Knowing the Emergency Evacuation Routes and Assembly Areas (AA);
- Completing the Assembly and Headcount Checklist in Appendix B.
- Maintaining the Emergency Action Plan binder.

**Please refer to the Safety SharePoint site for a list of  
Assembly Area Designated Coordinators**

### **ATI Millersburg Operations Off-Site Assembly Areas**

| <b>Plant Assembly Area</b> | <b>Location</b>                   |
|----------------------------|-----------------------------------|
| 1                          | Fitness Center                    |
| 2                          | Willamette Memorial Park Cemetery |
| 3                          | Willamette River                  |

### **ATI Albany Operations – 34<sup>th</sup> Ave Off-Site Assembly Areas**

| <b>Plant Assembly Area</b> | <b>Location</b> |
|----------------------------|-----------------|
| Primary                    | YMCA            |
| Secondary                  | Circle K        |





**Appendix B:**

**Assembly and Headcount Checklist** **Assembly Area # \_\_\_\_\_**

- ☐ Proceed to the Assembly Area.
- ☐ Obtain Emergency Radio, this Checklist, and put on the orange safety vest.
- ☐ Establish control of employees at the assembly area.
- ☐ Account for missing or additional personnel as checked in and notified by area Supervisor or designated employee.
- ☐ Monitor the Emergency Radio for further instructions or information.
- ☐ Area(s) involved in the Emergency notifies the SERO (Radio Talker) of missing personnel via the Emergency Radio when directed, (See Appendix D for radio communication guidelines)
- ☐ All area(s) notify the SERO (Radio Talker) of missing personnel that may possibly be in the affected area, when directed.
- ☐ When directed, all area(s) notify the SERO (Radio Talker) of Extra Personnel.
- ☐ Communicate relevant information to personnel assembled.
- ☐ Terminate assembly when instructed by the SERO or upon hearing an All Clear Signal (5-5).

**Missing Personnel**

---

---

---

---

---

---

**Extra Personnel**

---

---

---

---

---

---

**Completed by** \_\_\_\_\_

**Date** \_\_\_\_\_

**Send this completed form to the Safety Office.**



## Appendix C: Supervisor's Emergency Action Check List

### Life Safety

| <b>Assess the Situation and Secure Area</b> |   |
|---|---|
|   | Call Security at x6334 (Millersburg) or x7911 (34 <sup>th</sup> Avenue) - Determine if plant alarm is to be sounded |
|   | Evacuate the affected area/department   |
|   | Assign head count responsibility  |
|   | Determine hazards (real or potential)   |
|   | Tape/rope off the affected area   |
|   | Prevent re-entry of personnel into hazard area  |
| <b>Protect Yourself</b>                     |   |
| <b>Size Up Potential Hazards</b>            |   |

### Duty Check List

|  |   |
|--|---|
|  | Don Safety Vest   |
|  | Assign an employee to guide Emergency Vehicles  |
|  | For Fires - Ensure Sprinkler Control Valves are open and remain open until directed by a SERO to close          |
|  | Communicate hazard information to the Fire Department   |
|  | Maintain record of activities   |
|  | Continue to evaluate potential hazards  |
|  | Notify the designated coordinator that your crew is accounted for and note any missing or additional employees. |
|  | Turnover checklist and other collected data to SERO when on station   |

### Environment

| <b>Environmental Conservation</b> |   |
|-----------------------------------|---|
|                                   | Block storm drains - notify Environmental if material enters any drains x7140 * |
|                                   | Isolate Hazardous Materials   |
|                                   | Stop / prevent incoming material / product movement into area                   |

### Equipment/Building

| <b>Control of Energy</b> |   |
|--------------------------|---|
|                          | Mechanical - can equipment be shutdown?                                 |
|                          | Electrical - can electricity be shut off?                               |
|                          | Fuels (Gasoline, Natural Gas, H2 etc.)<br>Can fuel sources be shut off? |
|                          | Compressed Air  |
|                          | Removal of exposed material such as compressed gas, drums, etc.         |
|                          | Chemicals (CL2, acids, etc.)<br>Can chemical lines be secured?          |
|                          | Has anything been brought into the area that must be removed?           |

### Product

| <b>Product</b> |   |
|----------------|---|
|                | Remove or protect product only if it is safe to do so |

Record Time:

Activity / Action

---

---

---

---

---



## **Appendix D: Emergency Radio Communication Guidelines**

1. Emergency Radios are for communicating information concerning the emergency and Emergency Assembly only.
2. Before talking, listen and take care not to “over talk” other communications.
3. During assemblies the SERO will appoint a Radio Talker. Once the Radio Talker is established, all communication will be directed to the Radio Talker. The Radio Talker will announce him/herself when established.
4. Provide the relevant information to the Radio Talker when directed.
5. The following format will be used when calling the Emergency Radio:

**Who you are calling, “This is”, Who you are, Your Message, “OVER”**

Example: Radio Talker, This is Assembly Area #1 Receiving Warehouse, I have John Doe missing possibly in the affected area, Over

6. The following format will be used when answering a call on the Emergency Radio:

**Who called, “This is”, Who you are, Your Answer, “OVER”**

Example: Assembly Area #1 Receiving Warehouse, This is the Radio Talker, Acknowledge that John Doe is missing possibly in the affected area, Over



\* **Appendix E:**  
**Modified Mercalli Intensity Scale**

| <b>Mercalli Intensity</b> | <b>Equivalent Richter Magnitude</b> | <b>Witness Observations</b>  |
|---------------------------|-------------------------------------|--|
| I                         | 1.0 to 2.0                          | Felt by very few people; barely noticeable.  |
| II                        | 2.0 to 3.0                          | Felt by a few people, especially on upper floors.  |
| III                       | 3.0 to 4.0                          | Noticeable indoors, especially on upperfloors, but may not be recognized as an earthquake.   |
| IV                        | 4.0                                 | Felt by many indoors, few outdoors. May feel like heavy truck passing by.  |
| V                         | 4.0 to 5.0                          | Felt by almost everyone, some people awakened. Small objects moved. trees and poles may shake.   |
| VI                        | 5.0 to 6.0                          | Felt by everyone. Difficult to stand. Some heavy furniture moved, some plaster falls. Chimneys may be slightly damaged.                                |
| VII                       | 6.0                                 | Slight to moderate damage in well built, ordinary structures. Considerable damage to poorly built structures. Some walls may fall.                     |
| VIII                      | 6.0 to 7.0                          | Little damage in specially built structures. Considerable damage to ordinary buildings, severe damage to poorly built structures. Some walls collapse. |
| IX                        | 7.0                                 | Considerable damage to specially built structures, buildings shifted off foundations. Ground cracked noticeably. Wholesale destruction. Landslides.    |
| X                         | 7.0 to 8.0                          | Most masonry and frame structures and their foundations destroyed. Ground badly cracked. Landslides. Wholesale destruction.                            |
| XI                        | 8.0                                 | Total damage. Few, if any, structures standing. Bridges destroyed. Wide cracks in ground. Waves seen on ground.  |
| XII                       | 8.0 or greater                      | Total damage. Waves seen on ground. Objects thrown up into air.  |

Taken from USGS Website